Kampala International University Uganda

BACHELOR OF GUIDANCE AND COUNSELING

MODULE

RESEARCH METHODS

By

Tindyebwa Wilberforce, PhD,M.A ECON,BAE(Econ)

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Introduction

The Business School/CODL's aim is to become a market leader in the cost-effective provision of quality business management education leading to awards of certificates, diplomas and degrees internationally recognized and professionally acceptable. Throughout its history the business school/CODL has run a series of programmes primarily focused on business and management, which has been consistently, reviewed every three to five years to meet the contemporary needs of the market. The latest review was carried out in 2011 when the current curriculum was launched for six programmes: Business Administration, Bachelor of Commerce,

Businesses in the 21st century are experiencing profound challenges, which include the need to seek new market opportunities, develop new products that meet the changing demands of customers globally. The rapid growth of businesses and increasing transformations in the global economy has led not only to an increasing demand for specialists in the various management fields, but also to the need of a caliber of managers who are able to constantly adjust and innovate in the increasingly complex and volatile international business environment. It is upon this background that a modular system of teaching has been adopted to cope-up with the competitive environment of service delivery highly emphasizing on the concept of value for money.

The module enables a student to appreciate the concepts and examines the functions and roles of business in an organization. It presents a general overview and analysis of the main principles as a foundation for the more crystallized detailed description of policies, processes and practices, for purposes of setting ground for grooming the students in preparation for the challenging and dynamic field at the end of the course. For instance, accounting options seeks to provide answers to the need of management to maintain high and professional levels of competence in tracking, managing the inflows and outflows of resources in this volatile environment. It answers to the scientific managerial need for ensuring effective, efficient and productive use of resources and the ethical need for accountability and transparency.

The module explores various functional areas with accounting and finance, marketing and human resource management and examines in detail both conceptual and methodological tools that managers use to inform their decision making. Emphasis is placed on engaging with real life examples and applying course materials to specific familiar phenomena such as case studies. The main aims are to help students to understand the dynamics of today's business environment in the digital age.

Unit 1
What is research?
1.1 Introduction

Hussey & Hussey (1987) observes that although research is central to business and academic activities, there is no consensus on how it is defined. For example, Sekaran (2003) defines it as a process of finding solution to a problem after a thorough study and analysis of situational factors. Charles (1995) conceptualizes research as a careful, systematic, patient investigation undertaken to discover facts and / or relationship.

Note that such definitions highlight important characteristics of research, such as that it is a process, that is, goes though steps, it is intended to solve problems; that is, without any problem, there is no need for research; it should be thorough, that is not superficial; it is careful, meaning that it should not be done recklessly; it is systematic, implying that it should follow logical steps; it is patient, meaning that it may take loving (especially in the case of a PhD); it is intended to discover facts if it is qualitative; and to discover relationship if it is quantitative; and so on.

1.2 Why do we do research?

Research is intended to allow us, students, to develop and demonstrate ability to collect data relevant to a given problem; to analyze those data; to make independent judgment basing on the analysis; and to write clear reports (Kakuida, 1990). In other words through research we (students) get involved in a process of systematic discovery which enables us to have insights into managerial problems and finding ways of solving them.

1.3 How do we classify research?

We shall classify research in five ways, reflected by headings of subsections in this section:

Research according to subject or discipline

By subject or discipline, we shall mean area of study, subjects or disciplines can be looked at individually, in which case we for example have management, education, and ICT; or in terms of their two major groups, that is as either pure or social

sciences. Thus we can also classify research according to individual subject or discipline in which case we talk of management research, educational research, and ICT research. We can also classify research according to the two major groups of subjects or disciplines, namely as research in either the pure, basic, hard, physical or natural sciences or research in the social or behaviour sciences.

Sykes (1982) defines a "pure sciences" as "one studied without practical application" (p. 939). He also defines a "natural science" as "one dealing with material phenomena and based mainly on observation, experiments and inductive….." (p. 939). Thus when we talk of "pure, basic, hard, physical or natural science research, we are talking of research usually conducted in artificial or laboratory settings in such subjects or disciplines as chemistry and physics. As management students, such researches can not be our priority.

Sykes (1982) on the other hand, defines a "social science" as the study of human society or behaviour in such disciplines as management and education. Thus when we talk of "social or behavioural science research", we mean that research involving behaviour of human beings as friend sharing resources on this planet (Latin: Socuis = friend). Thus we are talking of research in such disciplines as management and education, that are of much relevance to our class. Given that research in such disciplines in social or behavioural, what challenges do we expect to face that our brethren doing pure, basic, hard, physical or natural sciences research may not face?

Research according to scope

Research varies by scope, scale or "unit of analysis". For example Okirima (2009)'s study entitled "motivation and staff performance in KIU" is interested in bringing out how motivation affects performance of an individual staff, thus Okirima (2009)'s "unit of analysis" is the individual staff of KIU. However, other researchers (for example see the research title: "Leadership and Performance of Schools in Uganda" are interested not in individual persons as "units of analysis" but in comparing whole schools, organizations, districts and the like.

The above two examples are intended to suggest that as per their scale, scope or "unit of analysis", we may classify research as micro or macro. Micro research (for example Okirima, 2009) is that interested in comparisons between small individual entities (for example staff and students) as "units of analysis", while macro research is that interested in comparison between large entities (for example organizations and districts) as "units of analysis". Note that as students, we are advised to undertake micro research on account of cost, time and skill limitations.

Research according to purpose

According to purpose, research can be either applied or basic / pure (Bailey, 1994). If research is concerned with solution of an immediate problem in a lay person's language (for example child sacrifice, school fires and an adequate information system) that research is said to be "applied", "problem – solving" or "action" research. Otherwise if research is trying to provide answers to questions of theoretical, hypothetical or academic nature, that is for the interest of academicians only (for example how motivation affects job satisfaction ….), then the research is said to be "pure, basic, theoretical, academic, hypothetical or theory – driven" which of applied and basic research is more suitable for us as PhD students and why?

Research according to approach

As per "approach or paradigm", a given research may be qualitative or quantitative, where a qualitative research is one based on the spoken and written words, reporting detailed views of respondents, intended to build a holistic picture of the phenomenon wide study. Quantitative research on the other hand, is research based on a variable measured with numbers, and analyzed with statistical procedures (Amin, 2005 Chap. Two; Bakkabulindi, 2004; Greswell, 1994).

It is worth noting however, that there is no research that is purely qualitative or purely quantitative: on the contrary, all researches have aspects of both research approaches or paradigms. So when we declare a given research as qualitative or

quantitative, we are only declaring the approach or paradigm to which it is biast. Which of qualitative and quantitative is a more advantageous research approach or paradigm for us as PhD students and why?

Research according to numberly of variables

As a research, you will be interested in measuring or observing variables on entities or "unit of analysis" of interest. The entity or "unit of analysis" could be a staff, student, policy or information system. Characteristics of that entity or "unit of analysis" (for example motivation, job satisfaction, effectiveness and efficiency) in which a researcher has interest are termed as "variables" because they are expected to vary from one entity or "unit of analysis" to another. We should observe that while some variables (for example sex and age) are measurable using one question or item say in a questionnaire, others (for example job motivation and discipline) have to be constructed using many questions or items, and are thus known as "constructs".

Alternatively, we can say that some variables (for example employee training and job performance) have to be conceived or conceptualized in terms of how they will be measured, and are thus also known as "concepts": thus the terms variables, constructs and concepts are normally synonymously used in research. What are the variables, constructs or concepts in your tentative research topic or title? On which entities or units of analysis will they be measured or observed?

The number of variables, constructs or concepts in a given research title or topic matters. For example, the research title or title: "Leadership styles used in faculties in KIU", implies a researcher interested in only one variable, construct or concept (leadership styles): such a study is said to be "uni – variate". However, while such a topic or title is the order of the day in quantitative research (subsection, quantitative research topics or titles are more pure, basic, theoretical, academic hypothesis – driven or theory – driven (subsection and should have at least two variables (that is be at least "bi-variate"), one being independent and the other, dependent (McBurney, 1990).

For example, a quantitative research could wish to explain what makes leaders in faculties in KIU to use the said leadership styles, in which case the quantitative researcher could come up with the topic: "Factors affecting leadership styles in faculties in KIU" in that case, leadership styles are the dependent variables (DU), while factors are the independent variables (IV). Alternatively, a quantitative researcher may want to see the effects of the said leadership styles or staff performance, in which case the quantitative researcher could come up with the topic: "leadership styles and staff performance in faculties in KIU".

In that case, staff performance is the dependent variable (DV), while leadership styles are the independent variable (IV). These two examples are intended to stress the fact that quantitative research topics or titles are co-relative, that they are interested in relationships between variables. To what extent is you are tentative research topic or title, co-relative?

1.4 The Research Problem

Introduction

One of the most difficult phases of any research project is the identification of a suitable problem. The problem is the axial centre around which the whole research effort turns. The heart of every research project is thus the problem. It is paramount in importance to the success of the research effort. To see the problem with unwavering clarity and to state it in precise and unmistakable terms is the first requirement in the research process. The identification of a good research problem should be considered a discovery in itself.

Problem identification

The selection of a problem even to the experienced researcher is always a difficult step in the research process. But graduate students especially spend many anxiety-

ridden days and sleepless nights worrying about where they are going to "find" the problem they need for their thesis or dissertation.

Such students tend to erroneously presume that every problem he/she identifies is dismissed by his/her supervisor as being trivial or "already done". The issue is not really the lack of problems as in reality there is almost an unlimited supply of problems. The real bottleneck is lack of familiarity with the literature by these students.

As we have seen, the first step in selecting a problem is to identify a general problem area that is related to one's area of expertise and of particular interest to him or her. Examples of problem areas might be: structured programmes for pre-scholars, use of inductive method for the teaching of elementary mathematics, discipline approaches for disruptive junior high school students, the use of para-professionals in elementary school, the whole language approach to reading, and the use of reviews to increase retention.

A problem obtains when differences exist between observed and expected outcomes. For example, differences of productivity between one employee and another under different styles of management. This evokes an interrogation in the mind and gives one the challenge to go and search for solutions in a systematic study.

When the problem is clearly defined, it is like demarcating or putting a fence around the problem. It is important to define the problem as a whole, as presented and go further to define the technical, unusual terms or words that have been given different meaning as employed in the statement. This does not only help establish the frame of reference used by the researcher but also eliminates the chance of misinterpretation of any of these terms. e.g. the topic of research may be "What effect does welfare assistance to parents have on the attitudes of their children toward work:? The terms vitalized must be given meaning in the context of the study'

The question is "What constitutes a problem situation in research?" A research problem can be conceived from several angles:

An interrogation

A research problem is an interrogation in the mind, whose answers a researcher takes interest to find out through a research study. For example, a researcher may seek to find Out why some students are unable to complete an academic programme in a university; or to find out why there is a shortage of workforce at a university; or to find out the comparative effectiveness of immediate versus delayed review on the retention of geometric concepts by second graders; and the comparative effectiveness of two different methods of teaching, methods A and B on students' performance, among others and so on.

An issue of concern

Gay (1996) defines a research problem as an issue of concern, which attracts the researcher and needs investigation. Initially, a general problem area is identified from which a specific problem is selected for focused investigation. A good problem has a number of identifiable characteristics. A good statement of a problem similarly conforms to a set of important criteria.

Unanswered questions

There are many unanswered questions, which may provide the basis of research problems. For instance, in education, we may ask the questions "Why do school children develop negative attitudes towards mathematics?, Why is there sex discrimination in the appointment of head teachers?"

Missing links

In education and other disciplines, there are missing links that may orient the researcher to identify appropriate research problems. For example, the lack of vocational context in our educational system and the absence of human rights education may result in a missing link.

Imbalances

There may be many imbalances in the system that could be the starting point for a research problem. The declining interest in arts subjects against the science subjects and the preference of white- collar jobs against blue-collar-jobs, for example.

Unsatisfactory state of affairs

In many cases the state of affairs is not satisfactory. For example, there is the much-lamented falling standards in our educational system; the increasing acts of indiscipline among school children; poor enrolment ratios in some parts of the country; human resource allocation in an organisation and internal and external efficiency of the higher education system in this country and so on.

Technological challenges

Technological changes and curricular developments are constantly bringing forth new problems and new opportunities for research. Perhaps more than ever before, educational innovations are being advocated in classroom organisation, in teaching materials and procedures, and in the application of technical devices and equipment.

Such innovations as computer-assisted instruction, teaching by television, programmed instruction, modified alphabets, new subject matter, concepts and approaches, flexible scheduling, and team teaching need to be carefully evaluated through the research process.

Considering the above possibility space for derivation of a research problem, it becomes all too clear that keen teachers will discover "acres of diamonds" in their own backyards, and an inquisitive and imaginative mind may discover in one of those problem areas an interesting and worthwhile research project.

So absence or scarcity of problems to be studied is not a problem. Selecting topics for research from a multitude of topics should be the problem. There are no

standard rules that will guarantee the suitability of research problems but the following are the guidelines:

Characteristics of a problem

When formulating research problems, it should be borne in mind that problems may have varying levels of importance to different people. Similarly, it is possible that some problems are easier to understand and investigate than others. Therefore, to ensure that one's research problem is appropriate, it should have four basic qualities, namely:-

- It should be reasonable or verifiable.
- It must have the theoretical and/or practical significance. This means that it should contribute to the improvement of knowledge.
- It should be clear.
- It should be ethical, that is, it should not involve psychological damage of people being investigated.

Gay (1996) similarly reiterates the researchability of a problem, as a basic characteristic of a research problem. A "researchable" problem is one that can be investigated through the collection and analysis of data. Problem dealing with philosophical ethical issues are not researchable. Research can only assess how people "feel" about such issues but it cannot solve them.

Whether or no there is reward and punishment in heaven may be an important problem t many people, but it is not researchable. There is no way to resolve it through the collection and analysis of data (at least at the present time). Similarly, in education there are a number of issues that make great topics for debate (such as "should prayer be allowed in schools?) but are too controversial or note researchable.

1.5 Theoretical / practical significance

A research problem should have a theoretical or practical significance. This means that the solution to a problem should contribute in some way to the improvement of the educational process. If the typical reaction to a problem is "who cares", it probably lacks sufficient significance to warrant a study.

Relevance

This requires that the answers to the problem must be useful. Such answers should address an important issue and the results should very well be applicable. It is proper and more beneficial that the problem is located within one's area of specialization. For example, it would be unwise for a student of masters of arts in educational management to formulate a research problem in psychology or human medicine because this would tantamount to groping in the dark and will make the credibility of results highly questionable.

Originality

Duplication nullifies the significance of the research problem because it adds nothing to the stock of knowledge, which is contrary to the expressed aim of academic research, that is to extend the frontiers of knowledge for the benefit of society. Therefore, every effort should be made to avoid duplication through extensive and intensive reading or by reviewing the literature given by earlier researchers. For example, it is useful to examine the earlier definitions of problems made by the previous researchers even though the topic is the same and already done by someone.

Take the case of relationship between family background and student performance at school. The previous researcher may have operationally defined family background as marital status, number of children and financial support. The new researcher may extend this definition to include:
family harmony, level of education of parents, and age of the parents, among others. Having found out that the earlier researches did not include some other

relevant attributes of family background as indicated above, one then directs his/her research on what their predecessors left out.

Feasibility

Another tenet of a good research problem is feasibility. With feasibility we are concerned with how possible it is to conduct the research. We insist that a problem chosen should be that which could be done within the programme time frame, which is generally two years for a masters programe. For example, a research problem like "Is life existing on planet Mars?". Time and the resources to finish the project are obviously beyond the reach of most researchers.

Another and quite very familiar example that also raises questions on feasibility is a problem which requires its researcher to investigate the problems affecting the academic performance of foreign students from 1970 up to date. This is not feasible because most of the subjects of the study can no longer be reached for data collection.

In essence therefore, it is prudent and advisable to avoid very broad and very ambitious problems that involve too many specific elements to consider. It is useful to take a problem that one can ably focus on and do it remarkably well. The research into the problem must be possible. It is no use investigating the analysis of educational spending of a district if it is not possible to access the financial records of the district.

Some of the questions concerning feasibility that the researcher should consider would include:

- Am I competent to plan and carry out this study?
- Are pertinent data available and accessible?
- Will I have adequate financial resources to carry out the study?
- Will I have enough time to complete the project?

Problem of interest to researcher

Since research demands much involvement, it is advisable to choose a topic and problem of interest, which will increase one's knowledge, and understanding of his/her particular professional area.

Narrow down problem

The next steps is to narrow down the general problem area to a specific researchable problem. A problem that is too general only causes grief because the scope of related literature review that the researcher must undertake would be unnecessarily increased.

Secondly, a too general problem is likely to result in a study, which is too general, involving too many variables, and the end results may be difficult to interpret.

In essence therefore, a well-defined manageable problem results in a well-defined manageable study. In narrowing the problem area, it is important to select an aspect of the general problem area that is related to one's area of expertise. For example, the general problem area "the use of reviews to increase retention" could generate many specific problems such as "the comparative effectiveness of immediate versus delayed review on the retention of geometric concepts" and "the effect of review games on the retention of vocabulary words by second graders".

Do not over narrow

However, in an effort to sufficiently delineate a problem the researcher should be wary not to be carried away. A problem, which is too narrow, is just as bad as one that is too broad. A study such as "the effectiveness of pre-class reminders in reducing instances of pencil sharpening during class time" (Gay, 1996) would indeed contribute little, if anything, to the science of education!

Problem is set in question form

A research problem is usually presented in a question form, for instance: What is the relationship between family environment and performance of students at

school? The question should have worthwhile significance to justify the use of human, financial and material resources on its research.

Furthermore, a question whose answer is already known ceases to be a problem and there is no more justification to research on it. In fact, any effort to research on it is like flogging a dead horse! For example, the causes of AIDS epidemic are no longer a problem because it is well known that sexual promiscuity is the cardinal cause. Instead, research should now be turned to the management of the epidemic in behavioural terms.

Ethical consideration

It is prudent practice to remain within the confines of acceptable ways of doing things. It is morally inappropriate to enter into the private lives of individuals. This is even more likely to lead to the refusal by respondents to give the right information for the research study. For example, if a researcher develops a problem like "Is there a relationship between Hernia and sexual promiscuity?" Then such a researcher goes on to ask people how often they have sex, say in a week. This is totally unacceptable and the respondents may refuse to cooperate with the researcher.

In certain situations, the research problem may be so sensitive that the respondents may choose to give evasive anti inadequate responses. To overcome this, it is important as much as possible to frame the questions very carefully so as to elicit authentic and right answers.

Sources of problems

Theory and experience are two major sources of problems.

Theory

As seen earlier, a theory consists of assumptions and propositions that present a systematic view of a phenomenon. From theory researchers understand, describe, explain and predict them by investigating the research problem. A theory contains

generalizations and hypothesized principles, which must be subjected to rigorous scientific investigation.

While there are several major sources of problems, the most meaningful ones are generally those derived from theory. There are for instance, many educationally relevant theories such as theories of learning and behaviour from which problems can be drawn. Theory-based problems are not only preferable in terms of contribution to true scientific progress in education, they also facilitate the formation of hypotheses based on sound rationale; these hypotheses in turn facilitate ultimate interpretation of study results. Theory-based problem results contribute to their related theory by confirming or disconfirming some aspects of theory and also by suggesting additional studies that need to be done.

Experience

Often times, selection of a problem based on theory can be a bit "heavy" for many research novices. There are so many problems that need researching that are not theoretical in nature. An obvious source of such problems is the researcher's personal experiences. In educational research, professional teachers have a wealth of experiences to generate a research problem from. For instance, it is hard to imagine a teacher who never had some thought concerning a better way to do something (a way to increase learning or improve behaviour as such) or been a consumer of a programme or materials whose effectiveness was untested.

From experience, the most likely sources to which, especially teachers, for example, may draw a research problem, or from which one may develop a sense of problem awareness are: the many problems confronted in the classroom, the school, or the community which lend themselves to investigation, and these are quite often more appropriate for research novices rather than problems that are more remote from their own teaching inexperience; the organizational or management procedures employed whose varied effects on performance attract research studies; the feelings of teachers about such procedures; the feelings of parents and students about them similarly supply research problems; the kind of

out of school activities and influences that seem to affect the teaching and learning processes.

Graduate academic experience

In addition, the graduate academic experience should stimulate the questioning attitude toward prevailing practices and effectively promote problem awareness. Classroom lectures, class discussions, seminars and reports and out-of-class exchanges of ideas with fellow students and professors will unveil a wealth of stimulating problems to be solved through research studies. Students who are fortunate enough to have graduate assistantship have a special opportunity to profit from the stimulation of close professional relationships with faculty members and fellow assistants.

Textbooks

Another fruitful source is reading assignments in textbooks, special assignments, research reports and term papers, all of which will suggest additional areas of need for research. Research articles when critically evaluated may reveal faults or defects that made published findings inconclusive or misleading. In this light, many research articles suggest problems for further investigation, which may prove fruitful.

Consultation with the course instructor

Consultation with the course instructor, advisor, or major professor is helpful. Although the student should not expect problems to be assigned, consultation and discussion with a faculty member is desirable. Most students feel insecure as they approach the choice of research problem. They wonder if the problem they may have in mind is significant enough, feasible, and reasonably free of unknown hazards. To expect the beginner to arrive at the supervisor's office with a completely acceptable problem is quite unrealistic. One of the key functions of the research advisor is to help students clarify their thinking, achieve a sense of focus, and develop a manageable problem from one that may be too vague and complex.

Literature review

From the review of other peoples' research, opportunities for more research are unveiled by the indicated "next step studies" which need to be done. Suggested "next step" may involve a logical extension of the described study or simply replication of the study in a different setting in order to establish the generalizability of its findings. For example, a study investigating the effectiveness of microcomputer-assisted instruction in elementary arithmetic might suggest the need for similar studies in other curriculum areas.

Practical issues

Each society is always faced with many burning issues, which are hard to completely explain; for instance, cost sharing in universities, problems of implementing Universal Primary Education (UPE), gender equality and women's status. A researcher can therefore decide to take one of these issues and investigate it logically with a view to finding a solution to the problem.

Deductive and Inductive reasoning

Induction is the drawing of conclusions from particular to general whereby observing similarities among specific situations creates a general rule. This approach is referred to as syllogism. For example: Mary is good at language (first premise); Mary is tall, (second premise); therefore, tall persons are good at language, (conclusion). Syllogism is based on major (first) premise, minor (second) premise and conclusion. As a researcher, one cannot just confirm such a rushed conclusion. He/she will want to investigate this in the population using a bigger sample than just one observation.

Similarly, deductive reasoning can generate a problem for research. This refers to a conclusion made from general to specific. It points out new relationships as one proceeds from general to specific. For example, girls are dependent; therefore Mary is dependent. This may not be applicable to the general population or in various places and hence calls for a more serious research to verify such a conclusion.

Questioning attitude

Questioning attitude towards prevailing practices and research oriented academic experience will effectively promote problem awareness and provide a source for a research problem.

Discussions, workshops, seminars

These may also provide sources for research problems.

Mass media

Mass media are communication channel with large audience and / or readership and / or viewer ship, and include Newspaper, Radio and Internet. For instance, in the recent past, several newspapers articles (for example Gyetaho (2009) have pointed at high turnover in Uganda's hospitals. As a quantitative researchers, one may want to come up with reasons why that problem exists, in which case a topic such as "Factors affecting retention of doctors in Uganda's hospitals….." arises. Also in the recent past, several newspaper articles (for example Runyambo, 2009 April 20) have raised the problem of low salaries in Uganda. As a quantitative researcher, one may want to study the effect of that problem, say on staff performance, in which case a topic or title such as "Remuneration / salaries and staff performance of teachers in ….." start persuign mass media, noting suggested research problems, and hence topics or titles.

Evaluating research problems

After a thorough search from at least one of the suggested sources, you will come up with at least one problem, and hence topic or title such as Bakkabulindi (2005)'s entitled: "Social correlates of innovation adoption: the case of ICT in Makerere University". Note that such a quantitative research topic or title has variables (name them) which it relates, and a context (name it) in which the proposed research is to be done. However, before such a topic or title is approved, several criteria have to be satisfied, including asking and positively answering questions to do with (Bakkabulindi, 2004: 31 – 33).

Newness (gaps)

While the verb "to research" literary means "to search again", a given research topic or title ought to be adequately new, so that it does not involve too much duplication. You may consider whether your tentative research topic or title has "content newness", that is in terms of variables; "contextual newness; that is in terms of area where the study is to take place;" Temporal newness", that is in terms of time. To what extent is your tentative research problem, and hence topic or title, new?

Interest

If your proposed research topic or title is not interesting to you, you will find it difficult to overcome challenges that will come at every step in your research process or cycle. This partly explains why as a student you are encouraged to search for research problems and hence topics or titles in your area of specialization (subsection 1.3.1) where you are expected to have interest. To what extent is your tentative research topic or title interesting to you in so far as it is relevant to your area o specialization?

Significance

Your proposed research problem, title or topic should be significant or justifiable in that if it is pure or basic (subsection 1.3.2), it has some important theories. Underpinning it; if it is applied (subsection 1.3.2), it should have some practice it intends to improve. If a topic or title is not significant, it is not worth undertaking because it neither adds to knowledge, that is has no theoretical significance nor leads to improvement in practice, that is it has no practical significance. To what extent does your tentative topic have theoretical and practical significance?

Feasibility

Your proposed research (problem, title or topic) should be feasible or viable in terms of skills, time and money. If not, it should be change or discarded. Is your proposed research feasible?

Assurance of guidance

Is there a potential super-vision for example. This partly explains why as students, we are encouraged to search for research topics in our areas of specialization, where we are assured of guidance or supervision from our respective teachers. Does your topic pass this hurdle?

Facilities

Are there adequate facilities such as literature for your tentative research? This is yet another reason why as students, we should search for, and propose research topics or titles in our areas of specialization, where we are assured of adequate literature. Does your tentative topic pass this criterion?

1.6 Research Variables

Introduction

Research in the social sciences is mostly based on the study of variations. This chapter is therefore concerned with the broader definition and analysis of the term variable, the types of variables and their role in research and ends with a presentation of the different levels at which variables can be measured.

Research variables

A variable can generally be defined as any thing that can take on differing or varying values. The values can differ at various times for the same object or person. Variables may for instance include production units, absenteeism, management style, motivation, age, and socio-economic status, level of education, occupation to mention but a few. These variables may be operationalised as follows:

Example 5.1

- Production units: In a publishing company, one worker can bind one book in two minutes, a second person might produce two in two minutes, a third person might produce five in two minutes and so on. It is also possible that

there is variation in the number of books bound by the same person every two minutes. In both cases, the number of books bound has taken on different values, and is therefore a variable.

- **Absenteeism:** In an organization the number of persons absent on a particular day may vary, theoretically from one person to all the workers.

- Management style: The management styles of head teachers constitute a variable, taking on such values as authoritarian, democratic and lessez-faire.

- **Motivation:** The levels of motivation of students to learn in a given class might take on varying values ranging from very low to very high. Also, a student's motivation to learn may vary from lesson to lesson.

- **Age:** The age of a respondent in a research may be given as 20, another 45 and another say 58. Age could also be categorized as young, middle age or old.

- **Socio-economic status:** This is categorized as lower, middle and upper.

- **Level of education:** This is categorized as no schooling, primary education, secondary education and university education.

- **Occupation:** This could be categorized as unemployed, civil servant, farmer or business person

Some researchers erroneously misconstrue an attribute as an alternative for variable. An attribute is a specific value on a variable.

Example 5.2

The variable sex or gender has two attributes, namely: male and female. Other variables may have more than two attributes.

Example 5.3

The variable agreement may be defined as having five attributes namely:
Strongly Agree, Agree, Neutral or Not sure, Disagree and Strongly Disagree.

Finally, there are two basic characteristics of variables that should always be achieved namely:

- Each variable should be exhaustive, that is, it should include all possible answerable responses. For example, if the variable is religious affiliation and the only options are Protestant, Catholic, Muslim, and Orthodox and there are others not known to the researcher, it is important to include others ... followed by the word "specify". This will ensure that all religions are captured.

In addition to being exhaustive, the attributes of a variable should be mutually exclusive; no respondent should be able to have two attributes simultaneously. While this might seem obvious, it is often rather tricky in practice. For example, the research might represent the variable "employment status" with the two attributes namely: employed and unemployed, yet these attributes may not be necessarily mutually exclusive. A person who is looking for a job while employed would be able to check both attributes. Researchers often use questions on surveys that ask the respondent to check / list / tick all that apply and then list a series of categories. Technically, each of the categories in a question like the one above should he its own variable and should be treated dichotomously as attributes that are mutually exclusive.

Types of variables

The types of variables that are typically used in research terminology are discussed here under the following categories.

- The dependent variable
- The independent variable
- The extraneous variable
- The moderator variable

- The categorical variable
- The numerical variable
- The discrete variable
- The continuous variable

The dependent variable

The dependent variable is also known as the criterion variable. It is the variable of primary interest to the researcher. The researcher's goal is to understand and describe the dependent variable, explain its variability or predict it.

Example 5.4

The Vice-chancellor of a university may be concerned that the lecturers are not committed to the institution, and seem to switch their commitment to other universities where they have part time jobs. In this example, the dependent variable is institutional commitment. Also a researcher may be concerned about the high drop out of the girl-child at the primary school level in Uganda. Dropout in this case is the dependent variable.

In the above cases, commitment and dropout are the presumed effects that are caused by other factors. Through the analysis of the dependent variable or finding out what variables influence it, it is possible to find solutions to the problem.

To qualify the aforementioned statement of finding solutions to the problem, the example of commitment and dropout need to be revisited. The Vice-chancellor might want to know what accounts for the variance in institutional commitment for purposes of controlling it. If the Vice chancellor finds that poor pay levels is the cause of lack of commitment by lecturers, then he/she can increase their pay levels that meet their requirements. Through this, he/she can be in position to have lecturers getting committed to the institution.

Likewise, the researcher concerned with the dropout of the girl-child might find out that dropout is affected by poor or lack of sanitary facilities, inadequate learning

environment, cultural practices and parental poverty. To solve the problem then, these issues would be addressed to solve the problem of dropout.

It should be noted that there is a possibility of having more than one dependent variable in a study.

Example 5.5

There is a conflict between quality and volume of output, low-cost production and customer satisfaction and so on. Quality and volume of output might be caused by change in technology, likewise is the low cost production and customer satisfaction.

Finally, in experimental research designs, a dependent variable (sometimes called Y variable in statistics) is one, which changes in relationship to changes in another variable.

Example 5.6

A lecturer might want to know what affects students' academic performance. This is a dependent variable. Is it the method of teaching, social class, type of motivation, attitudes towards a lecturer, classroom atmosphere or students personalities?

Independent variable

The independent variable is also known as the predictor variable or explanatory variable. It is the one that influences the dependent variable and it is the presumed cause of the variation in the dependent variable(s). It explains or accounts for variation(s) in the dependent variables.

Example 5.7

If the effect of a new educational programme on student's achievements is to be investigated, the new educational programme is the independent variable because it is expected to affect, explain or predict students' achievement, which is the dependent variable.

The independent variable may affect the dependent variable in a positive, negative or both ways, For example, on the positive side of it, the increases in the lecturers pay (independent variable) might lead to institutional commitment (dependent variable) and the provision of adequate sanitary facilities to the girl child in secondary schools might lower dropout.

An independent variable may affect a dependent variable negatively as provided for in this example. Banning of corporal punishments in schools has tended to increase students indiscipline. Banning of corporal punishment is the independent variable.

Furthermore, the following example provides a scenario where the independent variable can lead to both positive and negative effects. The adoption of genetically modified foods leads to high yields and less food nutrition content.

It should be noted that when an independent variable is present, the dependent variable is also present and with each unit of increase in the independent variable, there is an increase or decrease in the dependent variable also. For example, the students low or high understanding of the lecturer may depend on the teaching method(s) used. These methods may range from: lecture method, question and answer method, visual aid method or a combination of two or more of these methods. In this example, the teaching methods is an independent variable and students' understanding (conceptualized by the researcher) of the lecturer the dependent variable.
Also, one, two or more independent variable(s) may lead to one dependent variable.

Example 5.8
A student's academic achievement (dependent variable) may be a result of school environment, home environment, the community, student's interest and attitude etc. In the same way, juvenile delinquency (dependent variable) may be caused by poverty, peer pressure, nature of family control etc. (all being independent variables).

In the experimental research design, the independent variable implies several meanings. First, the fact that the administration of the independent variable is under the direct control for the researcher and, consequently, is independent of the individual subjects who are serving in the experiment.

The second meaning refers to the independence of the independent variable from all other potential variables that can affect the dependant variable; lack of independence implies a confounding of the independent variable with any other variable that happens to have varied systematically with the experimental manipulation.

The third meaning comes into play when we consider designs in which two or more independent variables are manipulated simultaneously in the same experiment.

In the three cases referred to above, the experimenters use factorial design, in which the dependent variables are manipulated in such a way that the manipulations are independent of each other and any effects associated with the independent variable (effects and interactions) are independent of each other as well.

It should be noted that experimental variables spell out the details of the investigator's manipulations. For example, the researcher may want to study factors affecting students' achievement (low or high) he/she may manipulate in the experiment any or all of the following: examine the absence / availability of books, laboratories, teachers, teaching methods and so on. All these, though independent variables may be used in. experimental research, hence their reference to as experimental variables.

The extraneous variable

The extraneous variable is also referred t as the intervening variable, confounding variable or covariate. It is a variable that surfaces between the time the

independent variable starts operating to influence the dependent variable and the time their impact is felt on it. There is a temporal quality or time dimension to the extraneous variables.

The extraneous variable surfaces as a function of the independent variable(s) operating in any situation, and helps to confound and explain the influence of the independent variable (s) on the dependent variable. The extraneous variable competes with the independent variable to explain the dependent variable.

An extraneous variable is any variable other than the treatment variable (independent) that if not controlled, can affect the experimental research outcome or result. If extraneous variables are not controlled, it would be difficult to know whether observed changes in the experimental research group are due to the experimental treatments or to some extraneous variable.

Thus, whenever a researcher administers instruments or tests, he or she should try to control extraneous variables that would interfere with the research results. Therefore, research designs must provide adequate control so that the effects of the independent variable on the dependent variable can be measured. The extraneous variables that affect the control of the research design contribute to its validity.

Example 5.9

A researcher may want to study how a new educational programme (independent variable) may affect the student's willingness to learn (dependent variable). However, within the students, there are those with high, medium, and low willingness to learn. The time factor, may however be an extraneous factor because willingness to learn across the three categories (high, medium, and low) can also vary over time.

Also, a researcher may want to study how workforce diversity (independent variable) influences organizational effectiveness. In this study, the workforce might

be multiethnic, multiracial, multinational, and so on. Thus creating the scenario of bringing their multifaceted expertise together in problem solving. This diversity in workforce is argued is a creative synergy. However, organizational effectiveness may also be influenced by the way the rewards are managed. Reward management becomes an extraneous variable.

In all, extraneous variables are not necessarily in the interest of the researcher but they have the potential to influence the outcome of the study. These variables may not be seen, heard or felt. They may for example be inferred from behaviour. For example, hostility is inferred from aggressive acts, learning is inferred from achieving high marks in examinations and anxiety is inferred from the restlessness of a person.

The moderator variable

This is the secondary independent variable, which is selected for study to determine if it affects the relationship between the primary independent variable and the dependent variable. For example, in the relationship between X (independent variable) and Y (dependent variable), if Y is altered by the third factor Z, then Z becomes the moderator variable. The following two examples explain this assumption well.

A theory may predict that diversity of the workforce contributes to organizational effectiveness (see earlier example) because each group brings its own special expertise and skills to the workforce.

However, this can be achieved only when the managers know how to harness the special talents of the diverse workforce. In this scenario, organizational effectiveness (dependent variable) which is positively influenced by workforce diversity (independent) is moderated by the managers' ability to harness the diverse skills and experience (moderator variable).

In the second example the following hypothesis can be postulated: 'a widow's attitude to remarriage is related to her social economic background'. Here, attitude is the dependent variable, while social economic background is independent (primary) variable. It is possible that widow's having children or no children, religious or not religious, may also affect her attitude towards remarriage. Thus, having children or being religious (which are secondary) become the moderator variable(s).

Categorical variables

A categorical variable is also referred to as a qualitative variable, and consists of discrete categories. A categorical variable has two or more categories that are distinguished from each other. For example, class (lower, middle, upper), sex/gender (male and female), religion (Catholic, Protestants, Muslim) are all qualitative variables.

Numerical variables

The numerical variable is also known as a quantitative or continuous variables. It is one whose values or categories consist of numbers and differences between its categories can be expressed numerically. For example, if five-year-old subjects are asked o mention their favourite colour (qualitative variable), the time it took them to respond, if measured, this later variable would be quantitative. If child A takes four minutes, Child B can take two minutes, child C can take 20 minutes and so on, then one can get the mean, mode and medium minutes.

A numerical variable may be discrete or continuous. For example a coin is tossed ten times. The random variable X is the number of tails that are noted. X can only take the values 0, 1,2,3,4,5,6,7,8,9,10; so this means X is a discrete variable.

On the other hand, a light bulb may be burned until it burns out. The random variable Y is its lifetime in hours. Y can take any positive real value. In this case, Y is a continuous variable.

The relationship between categorical and numerical variables

In most cases, the independent variable or the explanatory variable is categorical 4lnd dependent variable is numerical or continuous. For example, the number of crimes a person commits (dependent variable) may depend on the persons income level (high, medium and low); thus, income in this case is a categorical variable while number of crimes is a numerical variable.

In other words, a relationship is said to exist if the different categories of independent variable, say (low, middle and upper income groups) predict different values for the dependent variable, say, (number of times a person commits crime).

More about Extraneous Variables

Campbell and Stanley (1963) have suggested that there are two general types of validity in research results, which are influenced by extraneous variables; these are internal and external validity.

Extraneous variables and internal validity of Research Results

Internal validity of an experimental research design regards the extent to which, the researcher has controlled extraneous variables, so that any observed effect could be attributed solely to the treatment variable. Internal validity refers to the control of extraneous variables that would affect the experimental research results. This is because one of the objectives of the researcher in experimentation is to determine whether the variables that have been identified actually have a systematic effect on the dependent variable and whether the observed results were not affected by the extraneous variables. Therefore, the extent to which this aim is attained is a measure of internal validity of the experimental design and intervention.

Thus, internal validity is basically a problem of control of the extraneous variables. Campbell and Stanley (1963), have pointed out that there are eight more extraneous variables, which jeopardize or affect significantly the internal validity of experimental research design.

History:

This extraneous variable refers to the events or conditions that may occur between the first and the second measurement. For example, a researcher can give a test to students then in between war breaks out which will affect the students' performances. Therefore, the researcher should try to control the specific events, other than the experimental treatment that may occur between the first and the second measurements of the subjects to affect the dependent variable.

Maturation:

Maturation refers to the changes that occur within the individuals due to passage of time. For example, students may perform better in a test today because they are fresh and perform badly the following day because they are tired. In this case, the period that elapses during the experimentation may produce certain changes in the subjects. The subjects may perform differently on the dependent variable on different occasions as a result of biological or psychological process like fatigue, age, interest and motivation. The researcher should therefore try to control the effect of this extraneous variable on subjects due to passage of time, which could mistakenly be attributed to the experimental variable.

Testing:

This is a factor where in most experimental designs, a pre-test is administered, followed by the experimental treatment, and then a post- test is administered. If the two tests are similar, students might show an improvement simply as an effect of their experience with the pre-test. In other words, they tend to become test-wise". For example, if mock examination is administered for senior six (S.6) students, they may perform better at final examination, because of their learning experience with the pre-test at mock examination. In this regard, the educational researcher should try to place consideration on this variable and control it, because the exposure of the subjects to the pre-test way serve as the learning experience and therefore it may affect their post-test performance.

Attrition or experimental mortality:

This extraneous variable refers to those subjects that fall off during the course of the study. For instance, this may be due to sickness, death, lack of interest, transfer or when the institution closes. This will imply that the researcher cannot obtain complete information. Therefore, the differential loss of subjects from comparison groups may affect the findings of the study. For example, if some subjects in the experimental group who receive the lowest scores on the pre-test drop out after taking the test, this group will show higher mean on the post-test than control group, not because of the experimental treatment but because the 1ow scoring subjects .are no longer present.

Measuring instrument:

This extraneous variable refers to changes that may occur in the instruments used. An example is when a scale fails to produce the actual weight of the item being measured. And for instance, different measuring instruments, scores, raters, interviewers or the observers used at the pre-testing and post-testing stages may also account for the observed differences in the scores or measures of the dependent variable. Thus, by controlling this extraneous variable, which tends to affect the experimental research result, it would enable a researcher to realize dependable results with confidence.

Statistical regression:

This is a factor, which explains that whenever a test-retest procedure is used to assess change as an effect of the experimental treatment, there is the possibility that statistical regression accounts for observed gains in learning, because there is the tendency for extreme scores to regress or move towards the common mean on subsequent measures. Such a tendency may operate to produce an effect due to experimental treatment.

Statistical regression is therefore the tendency for research participants whose scores fall at either extreme on a variable to score nearer the mean when the variable is measured a second time. For example, supposed a researcher selected a

group of students who fell below the 15th percentile on a test of reading achievement. If the same students were tested again on the same or similar test (i.e. one that is correlated with the first test), their average score on the second test probably would be higher than on the first test with or without an intervening experimental treatment because of statistical regression.

Differential selection of subjects:

This extraneous variable refers to the situation where bias may be introduced as a result of differences in the selection of subjects for the comparison groups or when intact classes are employed as experimental or control groups. Selection bias, moreover, may interact with other factors such as history, maturation and so on to cloud even further the effects of the comparative treatments. In this regards, the groups may differ significantly on some important variables related to the dependent variable even before the application of the experimental treatment. For example, if the subjects in the experimental group in an experiment for retention are more intelligent than subjects in the control group, the former may perform better on the dependent variable (retention measure) even if this group did not receive the experimental treatment.

Selection maturation interaction

This is an extraneous variable, where there is confusion between the research design effects and the variables' effects. For example, when the two comparison groups have the same scores on the pre-test, some other differences due to interaction between the variables such as intelligence, motivation, interests, age and so on, rather than experimental variable may cause one of the groups to get higher post-test scores. Such interaction occurs when subjects are selected into groups on the basis of factors extraneous to the purpose of the experiment.

Experimental treatment diffusion:

If the treatment condition is perceived as highly desirable relative to the control condition, members of the control group may seek access to the treatment condition. Experimental treatment diffusion is especially likely if the experimental

and control participants are in close proximity to each other during the experiment. For example, suppose that some teachers in a school building i.e. the treatment group are assigned to use innovative, attractive curriculum, whereas other teachers in the same building i.e. the control group are asked to continue using the standard curriculum.

As the experiment progresses, some of the control group teachers might discuss the new curriculum with treatment group teachers, even if instructed not to do so. They might even borrow some of the materials and activities to use in their classrooms. Thus, over time the treatment 'diffuses' to the control group. If experimental treatment diffusion occurs, the effect of a treatment on the post-test will be confounded. Therefore, to avoid this problem the researcher should try to arrange conditions so that contact between experimental and control groups is minimized. After the experiment is completed, the researcher should interview some or the entire sample to determine whether experimental treatment diffusion has occurred in any form to enable him get reliable research results.

Compensatory rivalry by the control group:

This extraneous variable is sometimes called the John Henry effect. Compensatory rivalry involves a situation in which control group participants perform beyond their usual level, because they perceive that they are in competition with the experimental group. For example, an education researcher may find that there is a marked increase in mathematics achievement in the control group classrooms when they were compared with classrooms in which performance contrasting had been introduced. If this phenomenon occurs, the observed difference or lack of difference between the experimental treatment and control groups on the post-test can be attributed to the control group's unusual motivation rather than to treatment effects.

Compensatory equalization of treatment:

This extraneous variable can occur, if the experimental group receives a treatment that provides goods or services perceived as desirable. Under these conditions,

administrators may attempt to compensate the control group by giving it similar goods and services. If any such actions affect the control group's post-test scores, they would obscure the effects of the experimental treatment. The researchers, instead of comparing the treatment with a non-treatment control condition, are comparing one treatment with another treatment.

Resentful demoralization of the control group:

This is an extraneous variable where a control group can become discouraged if it perceives that the experimental group is receiving a desirable treatment that is being withheld from the control group. As a result, its performance on the post-test would be lower than normal. In turn, the experimental treatment would appear to be better than it actually is, because the difference between the post-test scores of the experimental and control groups was artificially increased by the demoralization of the control group.

Extraneous variables and external validity of research results

External validity refers to the generalizability or representativeness that experimental research results demonstrate. This is because, the second important objective of the researcher is to determine whether the systematic relationships that have been identified, isolated and measured can be generalized outside the experimental research setting. The extent to which this objective is attained is a measure of the external validity of the experimental research.

The results derived from the experiment are then generalized to other instances e.g. to teachers, students and parents. The generalizability of results depends on the extent to which the sample represents the population.

Campbell and Stanley (1963) have classified external validity into two types, namely: Population validity and ecological validity.

Population validity:

This extraneous variable refers to the idea that findings generalized represent the characteristics of the population. For example, if the research study was on Form Four in a given District, it might not be safe to generalize these findings to all the Form Four students in whole country. But if Form Four students in the given District effectively represents all others in the country, then the research generalization would be authentic and in this case, population validity would be catered for.

Therefore, population validity concerns the extent to which the results of an experiment can be generalized from the sample that was studied to a specified, larger group.

Example 5.10

If a researcher compared the effectiveness of programmed instruction and conventional method in teaching English literature on a sample of A- level students in Kampala District and found that programmed instruction is more effective, the researcher would conclude that programmed instruction is superior for other groups of A - level students in Uganda only there is strong similarity students of Kampala District and the rest of Uganda.

Usually, the researcher has to make distinction between the experimentally accessible population and the target population.

Generalizing from the experimental sample to defined population:

Generalizations from the accessible (sampled) population to the target population are somewhat risky and cannot be made with the same degree of confidence as the former type. For such generalization, the researcher must have a thorough knowledge of the characteris‟s of the accessible and the target populations. If the characteristics of both populations are similar, the researcher can generalize the results with confidence. Therefore, when the researcher attempts to generalize from accessible population to the target population, it is important for him/her to

know that one is similar to the other with respect to certain significant and relevant characteristics.

Variables interacting with treatment effects:

The interaction as a result of selection by treatment" also contributes to population validity. When a researcher selects two experimentally accessible populations and these are not representative of the same target population similar studies on two accessible populations can lead to entirely different results. In other words, an interaction that may occur between the treatment and the characteristics of one experimental sample selected from one accessible population would not be possible for an educational researcher to generalize the findings from one sample to another.

Extraneous variables and ecological validity

Ecological validity concerns the extent to which the results of an experiment can be generalized from the set of environmental conditions created by the researcher to different environmental conditions. If the treatment effects can be obtained only under a limited set of conditions or only by the original researcher, the experimental findings are said to have low ecological validity.

To have ecological validity however, a design must provide assurance that the experimental effect is independent of the particular experimental environment. A number of extraneous variables that affect the ecological validity of an experiment are listed as follows:

Failure to describe independent variables explicitly:

This is an extraneous variable, where unless a researcher adequately describes independent variables, future replications of the experimental conditions are virtually impossible.

In this case, the researcher needs to describe the experimental treatment in sufficient details so that other researchers can produce it. For example, suppose an educational researcher finds that the discussion method for Master students in

Makerere University is more effective than the lecture method in promoting positive students attitudes towards learning. However, the researcher's description of the discussion method may be so vague and incomplete that other researchers wishing to replicate the experiment may not ascertain whether they are using the same method in the same way.

Here, the experimental findings have virtually no generalizability to other settings. Therefore, the researcher must furnish a complete description of the operations and the experimental settings involved in the experiment study to enable a reader or another researcher to judge to what extent the results can be generalized to other situation.

Measurement of the dependent variable

This extraneous variable shows that dependent variables that the experimenter operationalised must have validity in the non-experimental setting to which he/she wishes to generalize the findings. For example, a questionnaire on career choice may have little validity in respect of the actual employment decisions made by undergraduates on leaving university.

This extraneous variable may also show the limitation in the generalizability of an experiment by the particular pre-test and post-test designed to measure achievement gains or another outcome variable. For instance, suppose the superiority of a hypertext program over a regular textbook was demonstrated on multiple-choice tests that students took shortly after completing the treatment condition. If the hypertext program is effective only because it facilitates students' ability to take multiple-choice tests, the results of the experiment would not generalize to other measures. For example, no difference between instructional formats might be found if the pre-tests and post-tests consisted of essays.

Multiple -treatment interference:

With regard to this extraneous variable, the researcher will use an experimental design in which each participant is exposed to more than one experimental

treatment. For example suppose each participant in an experiment receives three different treatments such as A, B, and C. If treatment A is found to produce significantly greater learning gains than treatment B and C because of the experimental design that was used, the finding cannot be generalized with confidence to a situation in which treatment A is administered alone.

The effectiveness of treatment A may depend on the co- administration of the other two treatments. Whenever it appears that multiple treatment interference will affect the generalizability of research findings, the researchers should choose any experimental design in which only one treatment is assigned to each research participant.

Hawthorne effects:

This extraneous variable refers to any situation in which the experimental conditions are such that the mere fact that individuals are aware of participating in an experiment are aware of the hypothesis, or are receiving special attention improves their performance. In education research for example, experimenters often give participating teachers and students special attentions.

This factor not the experimental treatment itself may cause a change in their behaviour. Should the Hawthorne effect occur, the external validity of the experiment is jeopardized because the findings might not generalize to a situation in which the researcher or others who were involved in the research are not present. For example, students may respond favourably to some questionnaire because they expect some gain. In this case, the researcher will unknowingly draw wrong conclusions.

Pre -test sensitization:

This is an extraneous variable, which explains how in some experiments the pre-test may interact with the experimental treatment and thus affect the research results. For example, if the experiment is repeated without the pre-test, different research results are obtained.

Post-test sensitization:

With regard to this extraneous variable, the results of an experiment may be dependent upon the administration of a post-test. This can happen, if the post-test is a learning experience in its own right. For example, the post-test might cause certain ideas presented during the treatment to "fall into place" for some of the students. When the experiment is repeated without post-test, the effectiveness of the treatment is diminished.

Interaction of history and treatment effects:

This extraneous variable suggests that researchers should not generalize beyond the time period in which an experiment was done. An experiment evaluating a new educational method might be done at a time when teachers are particularly disenchanted with a corresponding, conventional method. They might be exceptionally motivated to demonstrate the superiority of the new method. At later time, the experiment might be repeated and no difference would be found, because teachers no longer see the method innovative.

Interaction of time measurement and treatment effects:

With regard to this extraneous variable, administration of the post-test at two or more points in time may result in different findings about treatment effects. The usual practice is to administer the post-test immediately after the research participants have completed the experimental treatment.

Novelty and disruption effects:

This extraneous variable affects experimental result because a novel experimental treatment might be effective simply because it is different from the instruction that participant normally receive. If this is true, the results of the experiment have low generalizability, because the treatment's effectiveness is likely to erode as the novelty wears off. The reverse problem occurs with experimental treatments that disrupt normal routine. For instance, this type of experimental treatments might be ineffective initially, but with continued use participants might assimilate the

treatment into their routine and find it effective. Thus, the findings of the initial tryout are not general sable to a condition of continued use.

Controlling extraneous variables in experimental research designs:

The validity of an experiment is a direct function of the degree to which extraneous variables are controlled. If such variables are not controlled, it is difficult to evaluate the effects of an independent variable and generalizability of effects. The term "confounding" is sometimes used to refer to the fact that effects of the independent variable may be confounded by extraneous variables such that it is difficult to determine the effects of each. Therefore, the adequacy of experimental designs should be about the control of extraneous variables. This can be done by:

Randomization

Randomization is the best single way to attempt to control many extraneous variables all at the same time. This implies that randomization should be used whenever possible, that is subjects should be randomly selected from a population and treatments and subjects should be assigned to groups whenever possible.

Randomization is effective in creating equivalent representative groups that are essentially the same on all relevant variables thought of by the searcher. In addition to randomization, there are other ways to control extraneous variables.

Holding variables constant

Holding them constant for all groups can control certain environmental variables. For instance, in a study involving student learning and performance variables, which might need to be held constant include: learning materials, meeting place and time, in such cases students might be more alert in the morning than in the afternoon. Regardless of whether groups can be randomly formed, there are a number of techniques available to be used to try to equate groups.

Matching

This is a technique for equating groups on one or more variables the researcher has identified as being highly related to performance on the dependent variable. The most commonly used approach to matching involves random assignment of pair members, one member to each group. A major problem with such matching is that there are invariably subjects who do not have a match and must be eliminated from the study. One way to combat loss of subjects is to match less closely. A related procedure is to rank all of the subjects from highest to lowest, based on their scores on the control variable where each two adjacent scores constitute a pair.

Comparing homogeneous groups

Another way of controlling an extraneous variable is to compare groups that are homogeneous with respect to that variable. As with causal comparative research, a similar but more satisfactory approach is to form subgroups representing all levels of the control variable. If the researcher is interested not just in controlling the variable but also in seeing if the independent variable affects the dependent variable differently at different levels of the control variable, the best approach is to build the control variable right into the design.

Using subjects as their own control

This is another way of controlling extraneous variables, which involves exposing the same group to different treatments, one treatment at a time.

Analysis of covariance

This is a statistical method for equating randomly formed groups on one or more variables. In essence, analysis of covariance adjusts scores on a dependent variable for initial differences on some other variable such as pre-test scores, IQ, reading readiness or other variable assuming that the performance on "other variable' is related to the performance on the dependent variable.

Levels of measurement of variables

The information gathered in an investigation is the crucial element. When information is quantified, numbers are used to represent the characteristics we choose to study. Think about this transformation process; it is like translating words from one language to another.

If we gather data on a survey that indicates a person's political affiliation, we can label persons who identify themselves as Democratic 1, Republicans 2, those who indicate they are Independents 3 and all remaining types 4. What are you 1, 2, 3, or 4? Are you a Democrat, Republican, Independent, or other? The meaning is the same whether you identify your political grouping by name or number. Remember, however, that the numbers represented have meaning only for persons, who know the translation (the coding system).

The process described, called measurement, is the assignment of numbers to objects, event or characteristics according to rules. Assigning numbers operationally defines a variable. This assignment procedure can result in one of four levels of measurement.

Nominal measurement

When numbers are assigned to observations so that we can only make statements of sameness or difference, measurement is at the nominal level. Nominal measurement is the amplest form. With nominal measurement the number assigned to an observation serves as its name. Numbers are assigned to each category only to identify similar objects within a category from elements in another category that are different. For example, in the previous coding of Democrats, Republicans and Independents as ls, 2s and 3s respectively, the numbers only substitute for the labels and all persons in a specific category are thought of as equivalent. When measurement is nominal, the numbers assigned only have the property of being distinct from each other. The numbers do not allow comparison in terms of the variable being measured.

Ordinal measurement

The next complex level is ordinal measurement. In addition to categorizing elements, ordinal measurement ranks observations relative to each other. Runners completing a race are categorized as finishing first, second, third, and so on. The order in which they finish is ordinal measurement. A classification system that categorizes persons as above average, average or below average represents ordinal measurements. It is possible to compare ordinal measurements using statements such as "greater than", "less than", or "equal to".

Categories do exist and numbers are assigned to the categories, but the numbers have comparative meaning in terms of "frequency'. If a child watched a program 3 times this does indicate a greater frequency of viewing than a score of 1 or 2. Nominal level variables do not allow us to rank order of the categories. The student ranked 12th in the class achieved at a level below the student ranked 11th. Note however, that ordinal measurement lacks specificity. The amount separating observations is not indicated. While the runner who finished first ran faster, we do not know how much faster than the person who finished second, third and so on. Ordinal - level numbers do not represent equal intervals on the measurement scale.

Interval measurement

The third category of measurement is interval measurement. Measurement at the interval level possesses all the properties of measurement at the nominal or ordinal levels. In addition, the intervals between score categories are assumed to be equal. To consider the score values 50,70 and 90 as measurements at the interval level, for example, the 20-unit difference between 50 and 70 must represent the same amount of the variable as the difference between 70 and 90. In effect, in interval measurement, difference in score units are precisely defined and represent the same amount of the variable measured at all points on the scale.

An example of a variable that uses interval measurement is a Celsius Scale in which the unit of measurement is one degree. An increase in temperature from 30 to 35 is equivalent to increase from 0 to 5 or from 8 to 13. One unit of measurement (in

this instance, one degree of heat) represents the same amount of heat or absence of heat no matter where the measurement is taken.

Another characteristic of interval scales is the absence of a true or absolute zero point. With interval measurement, the numbers assigned to the scale are arbitrary. Even though some point on the scale has been assigned a value of zero, zero does not represent the complete absence of the characteristic being measured. The zero points on the Celsius and Fahrenheit temperature scales illustrate this. The temperature 0°F and 0°C do not represent the complete absence of heat. Rather, they are arbitrary points.

With interval measurement a score of zero on an ability test does not imply a total lack of ability. Zero exists on the scale only as an arbitrary point without a true or absolute zero score; there is lack of proportionality. For example, a test score of 30 does represent 15 more units than a score of 15.

However, a score of 30 does not represent twice as much of the variable as a score of 15. Comparative statements such as 'twice as much" or "four times more" should not be made when comparing specific scores values measured at the interval level.

Ratio measurement

The final level of measurement is the ratio level. Ratio scales have all the properties of the interval scale together with a true zero point. Examples of ratio-level measurement are height, weight, speed and elapsed time. We can make any comparative statement about the scores for variables measured on a ratio scale. Thus if one person weighs 35kg and another 70 kg, we can conclude that the second has twice the weight of the first; that is, ratios of numbers on a ratio scale are meaningful. The numbers themselves are anchored to an absolute zero point.

The majority of variables in the behavioural sciences are measured at nominal, ordinal and interval levels. Often, measurements are some where between ordinal and interval levels. Research has shown that treating such measures as though

they were interval is permissible and acceptable. Finally, the measurement scales are hierarchical. Nominal measurement is the least manipulative, ordinal measurement is an improvement over nominal and has all the properties of nominal. Interval measurement has all the properties of ordinal scales, and ratio scales have the characteristics of interval measurement.

When the measurement scale used is nominal or ordinal, the variable measured is discrete. Interval and ratio scales measure continuous variables. For discrete variables only specified numbers can occur. For example, if the variable sex (nominal) has been coded 1 for female and 2 for male, no numbers other than 1 and 2 can be assigned the observations. The same holds for original scales. Ranks 1, 2, 3, 4 and soon are assigned. The scales of measurement discussed above are summarized in table 5.1.

Table 5.1: Summary of measurement levels

Level measurement	Type of scale	Primary Characteristics
Optimal	Discrete	Categorization only for group identification – no comparison can be made among categories
Ordinal	Discrete	Categories can be rank ordered in terms of "moreness" of the variable. Measured categories do not represent equal amounts of the variable.
Interval	Continuous	Units of measurement are assumed to represent equal intervals or amounts of the variable-no absolute zero point exists.
Ratio	Continuous	Absolute zero point exists on the scale and can be assigned.

1.7 The Research Process

How do we do research?

We shall conceive or conceptualize the process of research, especially if that research is quantitative, as composed of five major steps as reflected by headings of sub-sections in this section (Bakkabulindi, 2004).

Proposal stage

During the proposal, planning or conceptual stage, a research topic or title is chosen (our chapter two); a proposal is developed (our chapters three to five); and a data collection or research instrument is designed (our chapter six); among other activities.

Data collection or research stage

During data collection, a research has two general (to data collection), namely primary and secondary. Primary, first – hand or field data collection is that aiming at new data by contracting or observing respondents or specimens (section 5.4), a research has at least three "methods" of collecting primary data, namely via observing relevant respondents or specimens; interviewing respondents; and using survey: we shall observe that quantitative researchers usually rely on the survey method of primary data collection, which usually involves use of self-administered questionnaires, on account of usually large samples used in quantitative research.

Qualitative researchers on account of small samples, can usually afford to use observation and interviewing as methods of primary data collection. In addition to primary data collection, some qualitative researchers (for example those doing historical research) also use secondary, desk, documentary or library data collection which takes place at a desk by way of consulting documents or library resources.

Data processing stage

During this stage, the data collected are processed or prepared for analysis. How? By editing or deeming them of obvious mistakes; by categorizing and / or coding

them; by entering them into computer; and presenting, summarizing or condensing them: for details, wait for our section 5.8.

Data analysis stage

In the analysis stage, the processed data are made interpreted or source of while data analysis can take several forms and hence names, data analysis techniques can be classified as either qualitative or quantitative / statistical, depending on the preferred research approach or paradigm (subsection 1.3.4). Paper MSF 6202 doct with data analysis.

Reporting stage

In this stage, the research methodology (that is how findings were arrived at) is summarized, together with the findings themselves and their implications (that is discussion, conclusion and pertinent recommendations) such reporting is for future reference by the researcher and other interested parties such as future researchers. Research reports can take several forms, and hence names such as dissertations or thesis in the case of students; conference and journal articles in the case of senior academics.

Application of Research Process

Introducing research

Stating background to the Problem Historical background

The historical background brings to picture the area or institution of study, the population in question and its characteristics and also traces back the history of the problem being investigated. It is at this point of its background that historical attempts by other scholars to deal with the problem and their findings are covered, including results and their recommendations.

Theoretical background

This part of the background seeks to clearly state the basic theoretical orientations (assumptions) about the variables being studied. The theoretical orientation should

be rooted in known theories of the phenomenon under investigation. For example, if the research problem is to investigate "management style and the participation of staff in organizational voluntary activities", an appropriate management theory that justifies the linkages should be identified.

The conceptual background

In this part of the background, the researcher conceptualizes the study variables by identifying and stating the basic elements that constitute the 'study variables and how such variables are related and are to be used in the study. For example, in research problem considered earlier:

"Management style and the participation of staff in the organizations ", consideration should be made on how management carries out its functions of planning, organizing, commanding, coordinating, controlling budgeting, staffing and evaluating and how the staff responds to such voluntary activities as attending staff get together activities, offer of service beyond office requirements, sharing of knowledge with colleagues and so on. Conceptual linkages are usually illustrated by using diagrams.

The contextual back ground

In the contextual background the researcher should indicate how the research maps on the general area of interest. This part of its background presents in comparative terms what should be against what is on the ground. For example, in the problem "management style and participation of staff in organization's voluntary activities", the researcher compares how the staff should be participating in voluntary activities against how they are actually participating.

The researcher then identifies the knowledge gaps by highlighting the variance between what is ideal and what is real on the ground. The elements responsible for the gaps should be identified and highlighted (Nkata, 2003).

Problem statement

A well-written statement of a problem should indicate the variables of interest to the researcher and the specific relationship between those variables, which are to be investigated, including the type of subjects involved. An example of a problem statement may be "The problem to be investigated in this study is the effect of positive re-enforcement on the quality of 10th graders' English composition".

The problem must be justified in terms of its contribution to theory or practice and the statement must be written in a way that gives empirical reference to describe the situation; clearly specifying the gaps in existing knowledge of the problem, the existing controversy and the non-conclusive evidence. It is important that the statement is presented logically; this can be done by use of the following sequence. (Nkata, 2003).

- First consider the magnitude, frequency and distribution specifying the geographical areas and population groups affected by the problem,
- Identify the probable causes of the problem paying attention to the current knowledge of the problem and its causes, taking note of the controversies and inconclusive evidence if available
- Analyze possible solutions as presented or attempted earlier with their results.
- Analyze unanswered questions with specific interest in areas that have not been possible to understand, determine, verify, or test.

The problem statement should make a convincing argument that there is not sufficient knowledge available to explain the problem and its possible alternative solutions, or it should make a convincing argument for the need to test what is known or taken as a fact.

Considering a case of a topic that wants to bring out a relationship between Makerere University sports management and the participation of students admitted on the four points scholarship scheme the statement of the problem could be:

Makerere University has been admitting sportsmen who excel at national level under a privileged four points scholarship scheme since 1993. However, those admitted under this facility do not take sports seriously after admission. The failure of students to participate in sports has caused an outcry from the University sports authorities. The researcher believes that management has a bearing on the sportsmen's low participation. It is therefore necessary to examine the management functions that affect student participation in Sports at Makerere University.

Sub-problems

The sub-parts of the main problem are called sub problems. It is important that the research problem is in such a size that the researcher can easily comprehend and resolve. Unfortunately, most problems are too large or complex to be solved without subdividing them. The strategy therefore should be to 'divide and rule" as every problem can be broken down into smaller, discrete units.

A good sub problem should be identified with the following:

- Each sub-problem should be a completely researchable unit. The solution of the sub-problems, taken together, combines to provide the solution to the main problem of research.
- Each sub-problem should be clearly tied to the interpretation of the data.
- The sub problems must add up to the totaling of the problem. After stating the sub problems the researcher should undertake to ensure that no inclusions are made in excess of nor omission from the main problem.

There should be two to six objectives (or sub problems) generated from the main problem.

Frmu1ation of research purpose, objectives, questions and hypotheses

Purpose and Objectives

The purpose and objectives should be defined after the problem has been clearly stated. The purpose and objectives are the intellectual activities that the investigator will perform throughout the research processes.

The purpose, at times referred to, as the general objective should specify the kind of knowledge the study is expected to obtain. It should state in concrete and concise terms the reasons for the study. For example, in the topic "the management of Makerere University Sports and the participation of students admitted on the four points sportsmen scholarship scheme". The purpose of the study could be:

> *"To investigate the reasons for the low participation of the beneficiaries of the four points scholarship scheme in the university sports activities*

The objectives of the study, which are also referred to as specific objectives, are components of the purpose. The objectives must follow logically from the purpose. To formulate the objects from above, we may need to conceptualize management into its component parts: planning coordinating, staffing, budgeting etc and derive the following objectives:

- To investigate the role played by planning in promoting the participation of beneficiaries of the sports bursary.
- To establish the relationship between coordination and participation of beneficiaries of the sports bursary.
- To establish the relationship between staffing and participation of beneficiaries of the sports bursary
- To establish the relationship between budgeting and participation of beneficiaries of the sports bursary etc
-

Example 6.1

Given that the general problem area as "The relationship between family background and student performance at school". The general objective may thus

be: To find out if there is a link between family background and students academic performance.

From this general objective we derive specific objectives by actually dissecting the problem area into separate elements that make up the family background or performance at school. Therefore our break of the family background will include among others, the following variables.

- Marital status.
- Number of children.
- The level of education of the parents.
- The income of the family
- Family harmony.

From these specific elements of family background, we formulate specific objectives as:

- To find out the relationship between marital status and children's performance at school.
- To find the effect of the number of children in the family on their academic performance at school
- To find out the effect of the level of education of the parents on their children's academic performance.
- To find out the relationship between family income and academic performance of children.
- To determine the effect of family harmony on the academic performance of their children.

The objectives should (Nkata, 2003):

- Be rooted in the problem statement.
- Match with the elements that constitute the problem area.
- Measure the elements against what is ideal.
- Be consistent with what is ideal.
- Be consistent with what the student wants to measure.
- Be testable
- Be stated in a form that reflects them as objectives.

- Be arranged in a coherent way.

The research questions

Schloss and Smith (1999) argue that a research question asks about the relationship between two or more variables. For example, a researcher conducting a survey on welfare reform may ask, "Will the preference for welfare reform vary according to the level of income of the respondent?". In another case, if a researcher is testing a new medication, he/she can ask, "Will users of drug X report fewer headaches than non users?" In yet another situation where a new training programme has been developed, the researcher may ask, "Will participants change their social behaviour by participating in the programme?"

Research questions basically reflect the purpose or the objectives of the study. After putting forward the general and the specific objectives of the research study, the formulation of the questions similarly takes the same trend and the first step to take is to state the general question of the research study and from there you put forward the specific questions.

As with the objectives above, the general question would be: "Is there a relationship between family background and children's academic performance at school?"

In a like manner, the specific questions would be:

- Is there a relationship between marital status and performance?
- What effect does the number of children in a household have on their academic performance at school?
- What is the relationship between education level of parents and the academic performance of their children at school?
- Does the income level of parents have an impact on the academic performance of their children?
- What relationship is there between family harmony and the academic performance of children?

Specific questions provide an indispensable screening device against duplication of what other people have already researched on.

A research problem is usually too big to handle as a whole. It is obligatory for the researcher to list down in form of objectives, all the various aspects of the problem and to ensure that they cover the whole research problem. Subsequently those objectives are then transformed into research questions. For example, a research study may have the following problem of comparing two instructional methods in adult literacy campaign programmes of which the likely questions would be (Kakooza, 2002):

- Which of the two methods of teaching adult literacy is more effective in bringing about more achievement among adult learners.
- How does the sex of a learner influence his/her achievement?
- How does the age of a learner influence his/her achievement?
- How does the socio-economic status of adults influence their achievement in literacy?

A meaningful research endeavour requires that the research questions must be related to the research problem and should not just b invented anyhow. It counts to avoid too many questions or else they may look like items on the questionnaire. Normally a set of four to six questions is easier to handle. However, the nature of the research problem will dictate the number of research questions to use. A prudent researcher always consults with people having a wealth of experience so that they critique the questions formulated in good time before the researcher engages in actual data collection.

The Hypotheses

A hypothesis is defined as a presumptive statement of a proposition or a reasonable guess based on available evidence that the researcher intends to check. For example, a hypothesis can be stated as: Adults taught using the lecture method learn significantly more than those taught by the discussion group method. Another

could also be stated as: There is a negative correlation between late coming to lectures and achievement. In essence, hypotheses are tentative answers to a problem. They are not absolute truths and not all researches need hypotheses; for instance, descriptive studies.

According to Best and Khan, (1993), a research or scientific hypothesis is a formal affirmative statement predicting a single research outcome or - a tentative explanation of the relationship between two or more variables, In order for the hypothesis to be testable, the variables must be operationally defined, implying that the researcher specifies what operations were conducted or tests used, to measure each variable. Thus, the hypothesis focuses the investigation on a definite target and determines what observations or measures are to be used.

Gay (1996) defines a hypothesis as a tentative explanation for certain behaviours, phenomena, or events that have occurred or will occur. A hypothesis states a researcher's expectations concerning the relations between the variables in the research problem. It is the most specific statement of a problem. It states what the researcher thinks the outcome of the study will be. The researcher then goes on to collect data that either support the hypothesis or do not support it. Hypotheses are essential to all quantitative research studies with the possible exception of some descriptive studies whose purpose is to answer certain specific questions.

A research hypothesis is thus:

- An assumption about the status of events.
- An assumption about the relation amongst the variables of the study.
- A tentative explanation of the research problem.
- A possible outcome of the research.
- An educated guess about the research outcome.

A research hypothesis can be formulated

- From existing theories.
- Based on some educational policy.

- From research findings of other studies.
- Based on some evidence.
- From some commonly held beliefs.
- From some intuition.
- From exploratory studies especially designed for this purpose.

A research hypothesis should:

- Be clear, specific and precise to guide the study.
- Be empirically verifiable to be meaningful to the researcher.
- Not contain statements that are contradictory as this will put to question, the validity of the results.
- Link dependent and independent variables that are measurable.
- Describe only one issue for which they are specified.

1.8 Types of hypotheses

There are basically two types of hypotheses namely: a research! alternative hypothesis and a null hypothesis.

Research hypothesis

A research hypothesis denoted by H_1 is a statement of an expectation about the outcome of a study. It is the hypothesis that the researcher wants to verify. Research hypotheses are stated in terms of dependent and independent variables. This statement involves linking these two types of variables. The research hypothesis, which is also called the alternative hypothesis, states that there is an effect of the independent variable on the dependent variable or that the two variables are related.

For example, the researcher may hypothesize that the teaching method (independent variable) has an effect on learning achievement (dependent variable) of children. Another example is: if the independent variable was attitude, and the dependent variable performance, the research hypothesis would be "there is

relationship between students' attitudes and their performance in Mathematics" or "students' attitudes affect their performance in mathematics".

The statistical or null hypothesis

The statistical or null hypothesis denoted by H_0, states that there is no effect of the independent variable on the dependent variable. The null hypothesis, with reference to the above example, would state that there is no effect of students' attitudes on their performance in mathematics. Also in the earlier example above, it would state that there is no relationship between teaching method and learning achievement.

The research or alternative hypothesis is the logical alternative to the null hypothesis. It is the hypothesis that the researcher wishes to establish by carrying out the investigation. However, it is the null (statistical) hypothesis that is subjected to statistical test. The two hypotheses are, however, complementary. This means that when one of them is true, the other is false and vice versa.

A research hypothesis is thus an assumption about the status of events; an assumption about the relation amongst the variables of the study; a tentative explanation of a research problem; a possible outcome of the research endeavour; and / or an educated guess about the research outcome.

Variables and hypotheses

A hypothesis is an assumption about relations between variables. It is a tentative explanation of the research problem or a guess about the research outcome. Before starting the research, the researcher has a rather general, diffused, even confused notion of the problem.

Also, a hypothesis can be described as a logically conjectured relationship between two or more variables expressed in the form of a testable statement. Relationships are conjectured on the basis of the network of associations established in the theoretical framework formulated for the research study. By testing the hypothesis and confirming the conjectured relationship, it is expected that solutions can be found to correct the problem countered.

Once researchers have identified the important variables in the situation and established the relationships among them through logical reasoning in the theoretical framework, they will be in a position to test whether the relations work, whether the relationship that have been theoretical do in fact hold true.

The linkage function of the hypothesis is illustrated below;

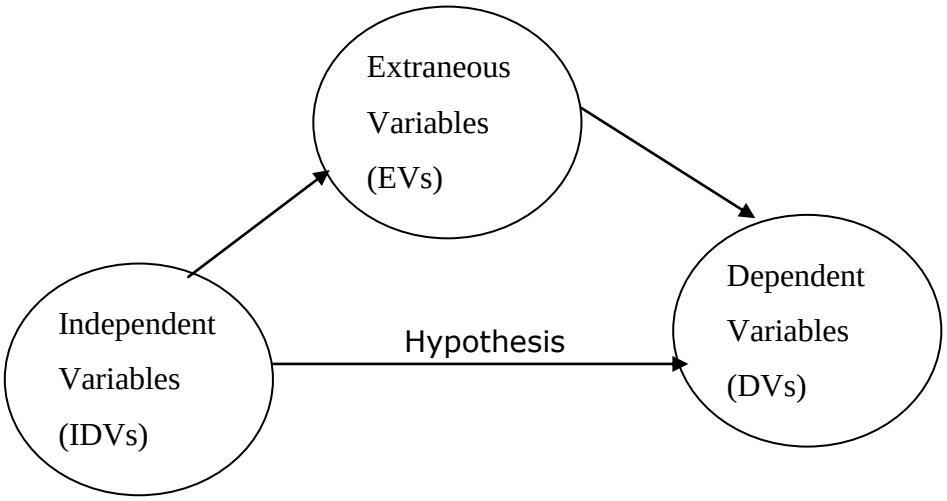


Fig 6.1: Linking the Independent and dependent Variables

- The hypothesis links the dependent variables (the variable of interest, one whose effect is being studied) to the independent variable (the explanatory or manipulative variable).
- However, extraneous variables that compete in explaining the variation in the dependent variable may exist.
- To make the link between the independent and dependent variables more plausible the researcher must control the effect of the extraneous variables as seen earlier.

More about the linkage: Scenarios of the research hypotheses

An example will be used to illustrate the different scenarios of the links between the independent variables and the dependent variable. Suppose the purpose of a study is to relate home background to the academic achievement of pupils in primary school. The indicators of these two concepts can be identified as / follows:

Independent variable (IDV)

- Number of years of marriage of parents(IDV1)
- Type of residence(IDV2)
- Family income(IDV3)
- Parents' education(IDV4)

The dependent variable, academic achievement can be conceptualized in terms of

- Change of attitude towards school (DV 1)
- Performance in school (DV2)
- Motivation to achieve(DV3)

(a) One-to-one linkage: One IDV to one DV

Here, one independent variable is used to explain one dependent variable.

(i) This could be a composite of IDV1 , IDV2 , IDV3 and IDV4 to form one IDV and a composite of the DVs (DV1 , DV2 and DV3) to form one dependent variable

(ii) This situation could also arise when one of the IDVs is linked to one of the DVs. For example, family income (IDV3) may be hypothesized to influence change of attitude towards school (DV 1)

These situations result in one hypothesis

(b) Many - to- one: Many IDVs to one DV.

Here there is just one dependent variable, which is linked to several independent variables. Two possibilities arise:

- Each of the IDVs is linked to the composite of the DVs
    - In the example above, each of IDV 1, IDV2 ,IDV3 and IDV4 are linked to the dependent variable (DV), academic achievement.
- Instead of a composite dependent variable the researcher may link each of the four independent variables to just one of the dependent variables, say, motivation to achieve (DV3)

Each of these yields four hypotheses.

(c) One - to many: One IDV to Many DVs

Here, one Independent variable is linked to several dependent variables.

(i) The one IDV may be a composite of the IDVs linked with more than one of the DVs

(ii) The IDV may be one of the several IDVs linked to more than one DVs

(d) Many - to many: Many IDVs to many DVs

Here, more than one IDVs are selected and linked to more than one dependent variables. This can yield as many hypotheses as there are number of IDVs multiplied by number of DVs. In the example above, there may be as many as twelve (4x3) hypotheses.

Notice that these linkages can result in either directional or non-directional hypotheses.

Directional hypothesis

Types of hypotheses can be described in terms of directional and non-directional

This is a hypothesis where direction of outcome is predicted. For example, "The lower the salary university lecturers are paid, the less committed they become to the institution". This hypothesis states the relationship between two variables namely salary and commitment. The low salary is the independent variable and less commitment is the dependent variable. The hypothesis stated here is directional that is, low pay leads to less commitment.

Example 6.2

"Boys perform better in science subjects than girls at secondary school" in this country.

Non-directional hypothesis

In non-directional hypotheses no direction of outcome is predicted. "There is a relationship between gender and performance in science subjects at secondary school level in this country". Here no direction is given on the relationship either because no study had been previously carried, hence no basis for such direction or because there has been conflicting findings in previous research studies.

Functions of hypotheses

Hypotheses serve two important functions in scientific inquiry, namely: the development of theory and the verification of an existing theory. At this initial level, the theory developer has some idea based on theory, past experience, observation and I or information gained from others. A hypothesis is formulated in such a way that this idea can be tested. Based upon the findings of the subsequent research, the hypothesis is supported or rejected and more hypotheses are formulated to continue the process of building a cohesive theory.

The most common use of hypotheses is to test an existing theory to show how it can be used to solve a problem. In every day situations, those who confront problems often propose informal hypotheses that can be tested directly. For example, when a lamp fails to light when the switch is turned on; several hypotheses come to mind based upon our understanding of electricity and our past experience with lamps.

- The plug is not properly connected to the wall outlet.
- The bulb is burnt out.
- The fuse is burnt out or the circuit breaker is faulty.
- There has been power failure in the neighbourhood.

Each of these speculations can be tested directly by checking the plug connection, substituting a bulb known to be in working condition, inspecting the fuse or circuit breaker, or by noting whether or not other lights in the house or in the neighbour's house are on.

Whenever there is a research question, there is usually a tentative answer to it. This is what we refer to as a research hypothesis. It is the researcher's hypothesis.

Therefore, the same trend as we had seen with objectives and questions equally and logically applies to research hypotheses formulation.

In the same way, from the general question, "Is there a relationship between family background and children's academic performance?" We shall have a general hypothesis. This will be: "There is a relationship between family environment and children's academic performance at school". The general hypothesis is however, not testable because it is too broad to verify.

The general hypothesis needs to be broken down into specific hypotheses, which are testable. In a similar way we formulated the questions we are obliged to prescribe specific hypotheses to each of the specific research questions that were formulated on the family back ground by just making corresponding tentative answers to them as follows:

- Marital status of the family has an effect on the academic performance of children at school.
- The number of children in the family affects their performance at school.
- There is a relationship between the parents' level of education and academic performance of children at school.
- There is a relationship between family income and children's academic performance.

1.9 Delimitation of the problem: the scope

Here the researcher specifies the restrictions and the limitations he imposes on the study. This statement helps determine the boundaries of the project by providing answers to such questions as who, what, when, how many among others. Leedy (199.7:59) says the limits of the problem should be as carefully bounded for a research effort as a parcel of land for a real estate transfer. He further discourages the researcher from getting involved in any data extraneous to this goal regardless of how enticing, interesting or exploratory it may be.

The delimitation will therefore help the researcher avoid being misguided by the discovery of interesting information that lie beyond the precincts of the problem under investigation by:

- Mentioning the geographical limits of the study.
- Specifying the concept limitation of the study.
- Specifying the area of concern/subject to be covered.
- Specifying the number of subjects to constitute the sample and their distribution among the population.

1.10 Justification and significance

The urgency and relevance of the project have to be justified. There is therefore a need to state in the very beginning how the results of the research will influence the institution or society in question. Best (1993) puts it that the researcher must demonstrate why it is worth the time, effort, and expense required to carry out the proposed research.

Presenting the justification for the study is therefore mainly intended to:

- Seek authority from government and other responsible bodies to conduct the study in the area, field and population in question.
- Persuade the funding urgencies to support/sponsor the study.
- Highlight the importance of the study to the organisation, country or the world as a whole.

The justification of the study helps prevent wastage of research effort on unimportant, trivial, superficial or insignificant problems. It therefore convinces the reader about the significance of the study and helps avoid having the researcher concentrate effort, time and resources on a problem without significance.

In advancing the above, the justification should answer the following questions.

- How does the research relate to the organizational, national, sub national and regional partners?
- What knowledge and information will be obtained?

- How will the results be used and who will be the beneficiary?

The significance of a problem such as "The management of Makerere University Sports and the participation of sportsmen admitted on the four points scholarship scheme" could be:

Uganda is currently depending mostly on talents for much of its representation in international sports activities faced by University Sports Managers and students. The findings of this study will benefit planners, administration and sportsman, which makes the study useful not only for Makerere University but also for National Council of Sports, Ministry of Education, and National Sports Associations.

Review Questions

1. Use five examples to distinguish between variables and attributes.
2. Examine the different types of research variables using examples.
3. (a) Identify some extraneous variables in a well-stated research context.
   (b) How would the presence of such variables affect the internal and external validity of the research results and
   (c) Indicate how you would control them.
4. The level of measurement of variables affects the statistical analysis that can be carried out on the data, comment

Unit 2

Reviewing Literature Pertaining a Research

2.1 Introduction

Literature review involves location, reading and evaluating reports of research as well as reports of observation, discussions and opinions that are related to the individuals planned research project. It also involves the systematic identification,

location and analysis of documents containing information related to the research problem.

Best (1986:39) views review of literati.ire as "a summary of the writings of recognized authorities and previous research that provide evidence' that the researcher is familiar with what is already known and what is still unknown and untested".

For Compte and Preissle (1993:153),

> "Literature review can be conceived of as an argument, a debate between the investigator and the audience, in which statements or propositions first are made by' the researcher in the form of assertions that a particular problem is interesting, worth investigating by means of specific methods, and amenable to interpretation by the theories suggested by the author".

In view of these conceptions, review of literature requires time and effort to identify, locate and analyze existing documents and information on the subject with the objective of revealing contributions, weaknesses and gaps. The review of literature can be Obtained from a number of sources.

2.2 Sources of Literature Review

Sources of literature review include documents such as periodicals, abstracts, reviews, books and other research books. These sources are classified into two categories, namely; secondary and primary sources.

Secondary Sources

These are publications written by an author who was not a direct observer or participant in the events described. In Uganda history for example, Buganda made an agreement with the British in 1900. According to this agreement some of the land was to be under the care of the Queen of England. A portion of Buganda land was given to the king of Buganda and to his chiefs. Different authors on this 1900

agreement who were not born by that time have made several publications. So what they write is referred to as a secondary source of information.

Primary Sources

This is a direct description of an occurrence by an individual who actually observed or witnessed its occurrence. For example, Universal Primary Education (U.P.E.) in Uganda was introduced in 1997 and from that time, many authors have made publications to this effect. Such authors who have observed and witnessed the beginning and progress of UPE provide a primary source of information on the subject.

Both sources are useful and very important. However, as much as possible the review of literature should be based more on primary sources since the authors of secondary sources may slant the intentions of primary sources to agree with their own view and leave out information that may contradict their personal views.

2.3 Importance of Literature Review

1. It shows that the researcher is aware of the available existing work already researched on in his/her area of interest from the perspective of methods used and to find out problems, which remain unsolved.
2. Identifies what the researcher takes to be key issues, the crucial questions and the obvious gaps in the current state of knowledge. It forms the foundation upon which all future work in this area will be built.
3. Review of literature enables a researcher to know the means of getting to the frontier of knowledge in the field of research.
4. It furnishes him/her with indispensable suggestions about comparative data, good procedures, likely methods and tried.
5. It helps a researcher to know in detail about all related research projects in progress but not yet reported.
6. It provides ideas, theories, explanations, hypotheses or methods of research, valuable in formulating and studying the problem.

7. It forms early chapters of a research report for the orientation of the reader and prevents pointless repetition of research.

Singh Sidhu (2001), argues that an intelligent researcher is so stimulated by the information about activities of previous investigators as he/she uses each bit of knowledge as a starting point for new and further progress.

2.4 Uses of literature review from conceptual viewpoints

Literature review is as important as other components of the research process. Review of literature has several important functions, which make it well worth the time and effort. It seeks to identify, locate and analyze information related to the problem.

Use of review in research problem identification

Research reports, especially those of academic nature, usually highlight areas of further research. These highlights are very rich sources of academic research problems. Through the review of literature, therefore, researchable problems can be identified, which saves the researcher, particularly those finding difficulty with identifying problems on their own.

Besides, the explicit presentation of areas recommended for further research, review of literature also exposes research problems.

Example 7.1

As an example, the review of literature related to the implementation of the Universal Primary Education (UPE) programme in Uganda may reveal that the teacher-pupil ratio in UPE schools is too high, dropout rates are high, teacher qualification and motivation is low and educational facilities are inadequate, which

may trigger investigation into the quality of primary education in the country since the introduction of UPE.

Use of Review in the theoretical perspective of a study

In carrying out basic research, there is usually need for a researcher to use a theory especially, as seen earlier, in basic research. Theories are statements about how concepts and variables are connected and their purpose is to explain why things happen as they do.

Review of literature helps the researcher to identify the assumptions and theories that underpin the study.

Example 7.2

If the researcher is making a study about the relationship between financial rewards and job retention, the researcher has to identify and read theories of motivation, which allow him / her not only to understand the linkages better but to be able to develop relevant questions and hypotheses that guide the research.

Example 7.3

If the researcher carries out a study on why rural children do not perform as well as urban children, theories that link learning to the environment will give the researcher orientation and guiding principles about the study. The principle may be for example that children learn better when they are exposed to a better learning environment. Then the researcher can move along this line and find out children who are better exposed to such an environment.

Review of literature helps to develop hypotheses. Hypotheses are educated guesses or tentative answers to problems. When a researcher uses a theory, he/she can identify a few aspects of that theory and then form the hypotheses of the study.

Literature review can help the researcher to develop or create a theory. Theories are created by developing a set of propositions, postulates or generalizations, which

establish relationships between things in some systematic way. Theories are human constructions derived from information, which people collect by seeing, hearing and touching.

Therefore, through gathering such information a researcher can develop a theory. For example, if a researcher reads a number of books about different institutes and finds that their success is attributed to their financial stand, then the researcher can make a theory based on this literature which postulates that the financial stand of an organisation determines its performance.

Theory makes explicit impact at every stage of the study, from formulation of the initial problem and selection of the population through data collection and analysis to interpretation.

2.5 Review in the Conceptual Perspective of a study

A research problem has concepts and variables derived from these theories. Variables are things that change. These may include performance of students, enrollment, age, motivation, economic status, leadership styles to mention but a few. Research aims at understanding why things vary.

Review of literature from a conceptual perspective allows a researcher to identify the concepts and variables in the study and show how these concepts are connected, usually in form of a diagram that shows how variables in a theory are connected. For example, a conceptual diagram that links inputs of a system to the process, the outcomes and subsequent evaluation of these outcomes may be illustrated as follows:

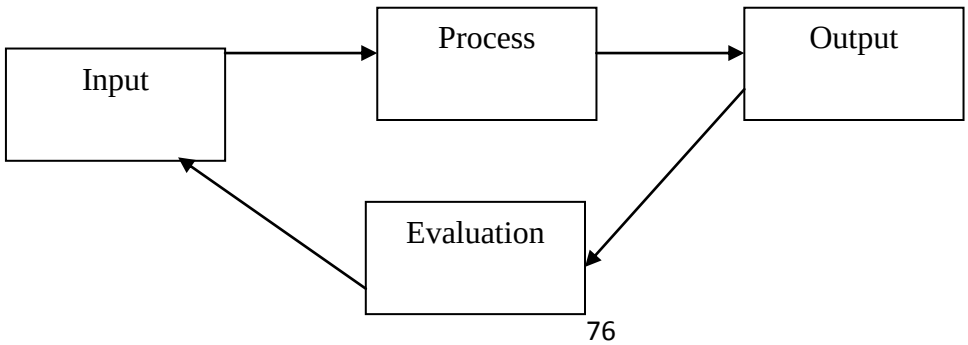


Figure 7.1:A conceptual diagram

Conceptual perspective may also be referred to as a scheme of concepts or variables that underlie the study and the relationship among these concepts or variables. Review of the literature allows for better operationalisation of concepts and permits the researcher to understand how these have been measured in the past.

Apart from operationaliSati0fl review of literature helps the researcher and reader to know how the variables in the study relate to each other. This is done by reading what other scholars have already studied in order to see how the variables are related thus giving clear understanding of the variables.

An understanding of the variables through the review of literature will help the researcher to show how the new study integrates with old ones and thus provide a study, which really fills gaps of the already existing findings.

Being familiar with previous research and relevant concepts also facilitates interpretation of the results of the study. The results can be discussed in terms of whether they agree with, and support previous findings or not. If the results contradict previous findings, differences between the new study and the others can be described, providing a rationale for the discrepancy.

If the researchers results are consistent with other findings, then the researchers report should include suggestions for the next step. If they are not consistent, then the researchers report should include suggestions for studies that will resolve the conflict.

2.6 Use of review from contextual perspective of a study

Research should be done in context. This is to say that research (especially applied and evaluation research) should be based on what is happening on the ground. Review of literature projects and justifies the context of a research problem.

Example 7.4

Consider a study on the impact of Universal Primary Education (UPE) on performance. Review of literature will give actually a true picture of the problem on the ground. Through publications like books, newspapers and journals, the researcher comes to get current information on the issue. Current enrollment, the teacher-pupil ratio, the pupil-classroom ratio, the attitude of parents' towards the programme and many other related issues may be known.

This contextual exposure gives the researcher a broader view of the problem under study. It gives him/her more insight to the problem and hence assists him/her to make the study more relevant.

Review of literature in the perspective of context helps the researcher to state his/her problem according to the situation.

Example 7.5

Many secondary schools are experiencing vandalism including some cases of burning of schools. A lot of publications have been produced about these incidences and so when the researcher collects this information in context, it can help the researcher to improve on the formulation of the problem.

Another important question of the literature review with reference to the context is that it points out research strategies, specific procedures and measuring instruments that can be used in a certain situation. Different Situations require different strategies and procedures. The situation on ground will help you determine which way to go.

Review gives the researcher an understanding of what has been done previously. It gives him/her a picture of the problem on the ground. This helps the researcher not to duplicate work that has already been done by some one else in the same context.

Literature review helps in limiting the individual's research problem and in defining it better. The situation on the ground will limit the study. For example, if government has supplied textbooks to UPE schools, then it is not proper to make research to find out whether primary schools have textbooks but probably can research in the use of these books and parents' participation in UPE programme.
In conclusion, review of literature is a necessary painstaking activity in research. It requires time and effort to collect it but it is very necessary since effective research is based upon past knowledge.

Review Questions

1. Distinguish between primary and secondary sources of literature.
2. Discuss the ways by which literature review helps in the various phases of the research process
3. Explain how the review of relevant literature can assist you the researcher to defend your study

Unit 3

Review of Literature from the methodological view-point

3.1 Introduction

In searching related literature, the researcher should note certain important elements: reports of studies of closely related problems that have been investigated; design of the study, including procedures employed and data-

gathering instruments used including the variables; populations that were sampled and sampling methods employed.

From a 'research methodology' point of view, it is, among others, useful in the areas of research design; population and sample, and instrumentation.

3.2 Research Design

This is the plan which the research study will follow. It is a series of advanced decisions that, taken together, make up a master plan or model for a research study. It is a stated structure and process of conducting a research project, detailing the plan and method for systematically and scientifically obtaining the data to be analyzed.

There are qualitative, quantitative and triangular research designs, each more appropriate for certain types of studies.

With regards to design in research methodology therefore, literature review is useful in a number of ways including the following.

First, the choice of research design made for a study is, or at least should be, a function of the type of study that is going to be conducted, the types of variables to be measured and the kind of data that are to be collected and analyzed.

What is appropriate depends on the kinds of questions being posed, the approach to research being constructed, the data being collected and analyzed, and the working styles and circumstances of the investigator.

Second, this means that a good choice of research design is only possible if the researcher has a good working knowledge of the research problem and different designs. The review of literature is a prime source of this much-needed working knowledge on designs used in different studies. In this way, it informs the researcher's choice of research design through exposing information pertaining to

the study thereby revealing the different peculiarities in the proposed study that ought to be considered in choosing the design.

Such a review reveals the kind of data that the researcher will probably be dealing with on conducting the study, hence assisting him / her to come up with an appropriate research design that will allow the easy collection and analysis of the data. This is so because the review of literature shows the type(s) of data previous studies in the area collected and how it was analyzed and may even predict the kind of data the researcher may expect to deal with.

Thirdly, the review of literature exposes the researcher to the various designs that have been followed in conducting studies of closely related, as well as other, problems and the effects to which the use of these designs has been. In this way, the review of literature signals the need to follow certain designs in conducting given research studies or the irrelevance of following them. The review of literature may for example, indicate that a problem has been studied based on the observation research design. This would inform future researchers of the irrelevance of following observation in carrying out a similar study, more so with a similar scope. On the other hand though, it may signal the need to follow different designs to conduct the study with the view to fill any gaps that might have been left by previous studies, particularly due to following the design(s) that they followed.

The review of literature justifies the choice of design made for a study. Having done the methodological review, a researcher can argue convincingly that even if the problem he/she wants to address may have been done by somebody else, the methods proposed for the study are different, and actually the most appropriate (Compte and Preissle, 1993). Hence, literature review enables the researcher to 'make a case' for his/ her choice of research design through enabling him/her to prove that the research study is not a duplication of previous work(s).

Similarly, since literature review logically leads the researcher to tentative, testable conclusions, the hypotheses, it should be noted that the research hypotheses to be

verified during the study determine the particular research design that is appropriate for the study.

3.3 Population, Sample Methodology and Sample Size

A population is the aggregation of items or objects from which samples are drawn, constituting the entire collection of observations to which study results generalize. A sample refers to the part of the population that is taken to represent the population in the study.

The appropriateness of a population and representativeness of a sample significantly impact on the validity and generalizability of the research findings. From the perspective of research population and sample, the review of literature is useful in the ways detailed below:

It informs the researcher where similar studies have been carried out. Effective research is based upon past knowledge, meaning that the duplication of what has been done must be eliminated from research activity. Indeed, in searching related literature, a researcher should, among other concerns note the populations that were sampled and the sampling methods employed. In this way, review of literature enables the researcher to know the population(s) Of which the study may or may not be relevant.

Example 7.6

The review of management literature may expose Hertzberg's study on the impact of salary on the work motivation of accountants and engineers in Europe (with the findings that there is no relationship between salary and motivation Kreitner 1995), thereby illustrating to the researcher the likelihood that similar studies may not need to use accountants and engineers because these have already been researched on.

However, review of literature may signal the need to conduct certain studies on certain populations using certain samples. The population and sample used for a study significantly impacts on the findings of the study. Hence, some studies may

need to be re-conducted, through using different populations and samples. In disclosing the populations on which previous related studies have been conducted therefore, the review of literature simultaneously reveals populations that are eligible for certain studies. Using the example of Hertzberg's study, the review of literature may indicate the need to conduct a similar study on a less affluent population say employees in the lower pay class, or people of different regions, since research responses and findings are subjective to the respondents living environment and conditions and these vary a lot. For example, Maicibi (2003) conducted "Herzberg's study on motivation using secondary school teachers in various districts of Uganda and the findings were opposite to Herzberg's, which he attributes to the population he studied.

Review of the literature justifies the choice of population and sample made for a research study, allowing the researcher to come up with an appropriate population and sample for one's study. Review of literature also provides him/her with an opportunity to convince readers that there is a compelling need to carry out a study on a given population using a given sample, and that these enhance the objectives of the study most appropriately and are therefore acceptable.. Compte and Preissle (1993) for example, opine that the arguments in the review of literature should be tightly constructed so that the reader is convinced of the relevance and interest of the research questions and the adequacy and appropriateness of the choice of population and sample.

3.4 Instrumentations Used

This is a description of the tools of data collection used in a study. They typically include interviews, questionnaires, documentary analysis, psychological tests, focus group discussion techniques and many others.

Different research instruments employ distinctive ways of eliciting, quantifying and describing data and each is particularly appropriate for certain sources and types of data. Like the population and sample, the instruments used in conducting a study significantly impact on the type of data collected, the analyses and subsequently the findings of the study. Instrumentation is therefore another area in research methodology that is aided by the review of literature. This is analyzed thus:

- It provides information about the type of data that the study is likely to necessitate, hence enabling the researcher to determine the instruments that allows the easy collection and analysis. This is so because, as discussed earlier on, the review of literature shows the type(s) of data previous studies in the area collected and how it was analyzed and may even predict the kind of data the researcher may expect to deal with. The review of the literature could for example help the researcher to know whether to expect qualitative, or numeric data, which helps him/her to decide on the appropriate research instrument to use in conducting the study.
- It guides choice of instrumentation. As already discussed, the review of literature exposes the theoretical and conceptual frameworks of the study; illuminates the variables and concepts to be studied; and logically leads the researcher to the study hypothesis or hypotheses.
- The hypotheses to be verified, concepts and variables to be related during the study determine the data that will be required for the study and, of course, the appropriate data gathering instruments to be used. Thus the review of literature leads the researcher to the appropriate research instruments to be used in conducting the study.
- The review of literature reveals the instruments that have been used in conducting previous studies. In this way, it informs the researcher's choice of instrumentation, particularly advising on 'which instruments to use for which study.' As a corollary, the researcher is capacitated to come up with the most appropriate set of research instruments for the study since he/she makes the decisions pertaining to the same with knowledge of what has been used and the effects to which this has been. Moreover, review of literature also provides a working knowledge of the problem being studied and how data

regarding to it and closely related problems have been gathered in conducting previous studies, which makes the choice of research instrument more straightforward.

- It enables the researcher to find and provide justification for the choice of instrumentation made for the research study. The review of literature exposes to the researcher the instruments that were employed in conducting previous studies of the problem as well as closely related problems. It also reveals the effects to which the uses of these methods were. In this way, the researcher is not only provided with a working knowledge of the instruments that have been employed in the past but is also helped to expose the need for conducting a study using specified instruments.

For example, the review of literature may expose that a given problem was studied using observation as the major data collection instrument, thereby enabling the researcher to justify his/her use of questionnaires in conducting a similar study, especially if he/she thinks that the instrument used for the previous studies was ineffective in some way(s).

- It prevents the duplication of research activity. As already discussed, the review of literature informs the researcher about the instruments that have been employed in conducting studies of closely related problems. This keeps him from choosing research instruments that have been used to study similar or closely related problems, hence avoiding the duplication of research activity since research is based on past knowledge and it is paramount to avoid duplication in conducting research activity.

3.5 Method of Data Analysis

Data analysis is the evaluation of data. It is the process of systematically applying statistical and logical techniques to describe, summarize, and compare data. Methods of data analysis refer to the way(s) the hypotheses are tested using the data collected from the research study. In this regard, review of literature is useful in the following ways:

- Review of literature exposes the concepts and variables that are to be studied in conducting the study and, as already mentioned, logically leads the researcher to study hypotheses to be verified through data collection and analysis. The data analysis methods adopted for a study should reflect the type of data, particularly concepts and variables, being studied and hypotheses being verified (Gay 1996). In informing the researcher about these concepts, variables and hypotheses, therefore, the review of literature enables him to arrive at appropriate method (s) of analysis for the study.
- It helps in the choice of data analysis units to be used in analyzing the data collected during the study. The general theoretical perspective informing the research, which is developed through the review of literature, establishes broad parameters governing how units of analysis are defined Goetz and Hansen, (1974) just as Compte and Preissle (1993) opine that the arguments in the review of literature should be tightly constructed so that, where possible, they support "the interpretation of data and the conclusions reached."
- Literature review reveals the data analysis methods that have been used in conducting studies of closely related or similar problems and provides justification for the choice of method(s) adopted for the study. After guiding the choice of methods of analysis adopted by the researcher, the review of literature doubles as the means by which the researcher finds and provides justification that the method(s) chosen for the study is (are) the most appropriate for the study.

- The methodological review examines how prior studies were done. Having done the substantive and methodological reviews, a researcher can argue that the topic he/she wants to address has not been done by anybody else, or, if the topic actually has been studied, that the methods proposed for this study are different (Compte and Preissle. 1993:154)

In Conclusion, although literature review is dreaded by many scholars and often becomes a desperate search for a few confirmatory studies - which can be cited in

support of the legitimacy of one's research questions, appropriateness of design, and validity of conclusions (Compte and Preissle,1993) - it is variously useful and indispensable in research. It is a valuable guide to defining the problem, recognizing its significance, suggesting promising data gathering devices, appropriate study design, and sources of data.

Review Questions

1. The appropriateness of a population and representativeness of a sample significantly impact on the validity and generalizability of the research findings Comment
2. Critically analyze the use of literature review in developing the research design for your study
3. Explain how one can draw a tentative hypothesis from the review of the literature

Unit 4

Qualitative Research Designs

4.1 Introduction

When essentially qualitative approach is to be used in doing research, the plan of research to adopt is called the qualitative design.

Qualitative data gathering procedures are useful because they are considered more useful to the diversity of "multiple realties" one finds in the complex field situations. We will examine them one by one.

4.2 Observations

Observation is a method of data collection that employs vision as its main means of data collection. It is a process in which one or more persons examine what is happening in some real-life situation and then classify and record pertinent happenings according to some planned scheme.

An observation is an indirect method of data collection since in most cases, it collects information without the full knowledge of the respondent. Often, even if the respondent knows that he or she is being observed, the actual nature and purpose of observation are not known.

The observation method of data collection uses systematic procedure to identify target phenomenon to categorize, observe and record and it may be used alone or to supplement information collected using other methods.

Observation is one of the most common ways of finding out about things Berg (1989). It is used in almost all our daily activities. One can observe the way other people behave as well as the environment in which people live and interact.

Observation is based on a checklist or form containing the things to be observed.

Observation information may fall into two categories:

- Physical things for example farms, pieces of equipment, buildings and so on.
- Social process such as classroom interaction and community relationships.

In both cases, a detailed schedule is required on what to observe and how the recordings should be done. For physical things, it is easy to design an observation

schedule since it is mainly concerned with the number of objects to observe, sizes and definition of their conditions and so on.

In social interaction, the researcher must know exactly the variables to be observed and those variables must be well defined operationally.

The main difference therefore, between observation in daily life and observation in research is that in research, there is order and system in the way observation is done. In everyday life, observation is rather haphazard and informal.

4.2.1 Uses of Observations

1. Observational techniques of data collection make it possible for the researcher to obtain first-hand information about the objects, events and object-event interactions of interest. In contrast, information provided by respondents in questionnaires and interviews can be inaccurate, prestige-biased or faked.
2. Other than yielding first-hand information which is more valid, observation method provides additional, unexpected but useful information which may be encountered during observation sessions.
3. It is preferred when studying children, illiterates, handicapped persons, traits that cannot be tested with pen and paper.
4. Observation allows researchers to formulate their own version of what is occurring, independent of the participants.
5. Observation is also best used in assessing customer service, case study research, or situations where gathering detailed information on behaviour is critical.

6. It is also used in observing directly the behaviour of customers, rather than self reported behaviour. This removes one of the major causes of error on market research i.e. memory loss, poor recall and perceptions affected by appearance.

7. It reduces error due to translation and provides a richer data set that includes non-verbal and physical behaviour.

Observation is used in research to try to understand a particular puzzling question or a phenomenon.

4.2.2 Preparation for observation

To carryout systematic observations, the researcher must make prior arrangements. The essence of making arrangements is to obtain valid data. For example, if one is to observe school lessons, the cooperation of school heads and teachers must be sought, technological gadgets must be appropriately mounted, and strategies must be adopted to ensure minimum distortion of the phenomena under observation.

Preparation for observation therefore involves a number of steps:

4.2.3 Definition of aims and objectives

Systematic observation starts with the definition of objectives and focus of observation. It is neither necessary nor feasible to observe everything in any situation. A selection process by which the researcher decides what to observe is imperative. This is done by defining the aims and objectives of the observation as derived from the purpose of the study.

Example 9.1

If the research purpose is: "to find out the teaching aids used in history lessons"; the researcher must ignore other aspects of lessons such as content, structure and focus only on teaching aids. The objectives of observation could be to identify different types of teaching aids used, to count the number of each type of teaching aid used, and to record the number of times each teaching aid is used.

The specification of these objectives guides the researcher to collect only data that is useful for solving the research problem.

Selection and definition of attributes:

Having defined the objectives of observation, the researcher proceeds to select and define the target objects and events. He/she then defines the characteristics of each item that differentiates it from other items. The essence of the procedure is to prevent confusion in categorization among different observers or by the same observer at different times, different places, and different encounters.

It enhances the reliability of the counting and recording procedure. Attributes observed should, as much as possible, be externally observable and have denotable characteristics, not abstract qualities such as inquiry or honesty. Abstract qualities should be defined by their denotable characteristics.

Selection of observation modes and training of observers

After selection of the target objects and events, a decision is taken on the mode of observation to adopt. Observation can be carried out using the natural sense or technological gadgets. The observer can be a participant in the target situation or nonparticipant. What is most appropriate for a particular situation should be ascertained before the actual observation is undertaken.

The major consideration that guides the choice of observation modes is minimum interference with the observed situation. Minimum interference can be at optimum levels when using one-way screens, remote sensors, light differential and elevated corridors to keep the observer out of the view of the participants. Otherwise, micro-recorders may be used to make the subject less conscious of their being observed. If a participant observer, the researcher must not play a leadership role.

Having selected the modes of observation, observers should be trained, in practice sessions, to use the chosen modes of observation reliability. Trial testing in similar situations will serve dual role of training and refinement of procedures. If trial testing is not possible, video tapped recordings of similar situations may be used to train observers to observe and code attributes accurately. Observers who are not

consistent should be replaced. After training, observation should commence within an appreciable time lapse to prevent loss of observer skills.

The number of visits needed for reliable observations must be considered

The number of observations needed to attain the objectives of the study should also be ascertained. If one is estimating the frequency of use of different teaching aids, the number and time of visits required to obtain an adequate sample of lessons must be decided upon.

Observer Effect

An issue to be taken into consideration during observation is observer effects. It is difficult to observe without introducing some distortion to the events that would have occurred if observation were not taking place. Possible techniques for minimizing the distortion influence of observation are habituation, assessment of effects, and remote presence.

Habituation is a situation in which the observer stays in the setting long enough to be taken for granted prior to the observation sessions.

Assessment of observer effects may be made if they cannot be eliminated. For example. if an acceptable behaviour occurs, in spite of the observation, one may assume that the distorting effect of observation was minimal.

Remote presence means that the observer and observation gadgets are placed at a distance that is ignored by the subjects.

Finally, the researcher must consciously guard against halo effects and interpretation bias during observation.

4.2.4 Observation types

There are several types of observation, some more popular than others. Although basically similar, they do differ from each other in the degree of the observers

participation in the environment, in the setting in which they occur and in the manner in which they are organised. Some examples of observation are:

(a) Naïve and scientific observation

Naïve observation refers to everyday, unstructured observation, which people use when they interact with others in social situations. Observation becomes scientific when it is systematically planned and executed, when it is related to a certain goal and when it is subjected to tests and controls.

(b) Participant and non-participant observation

In general, the degree of the observer's involvement in observation varies from no participation at all to full participation. In the first case, observers study their subjects from outside the group without becoming a part of the environment of the observed; in the second case, they actually become members of the group they are supposed to study. The first type of observation is known as non-participant observation; the other is participant observation.

i) Non-participant observation

The observers are not part of the environment they study. Their position is clearly defined and different from that of the participants. In ideal terms, the observers are invisible, not noticed and outside the group they observe. The best example of non-participant observation is laboratory observation where the subjects interact in a laboratory and the researcher observes them from the outside, for example, through a one-way vision glass. Observing children playing in the school playground through a window is another example of a non-participant observation. In both cases, the observer does not actively participate in the group under study.

ii) Participant observation

In participant observation, the observers observe from inside the group, and ideally their identity, as researchers are not known. For instance, researchers who want to observe criminals in action manage to become members of criminal gangs. As a member of this group, one can study among other things their structure, process,

problems and attitudes from the inside and as experienced by the members of the group.

c) Structured and unstructured observation

These two types of observation differ in terms of degree to which they are structured. Structured observation employs a formal and strictly organized procedure, with a set of well-defined observation categories and is subjected to high levels of control and differentiation and it is organized and planned before the study begins. Unstructured observation is loosely organized and the process of observation is largely left up to the observer to define, (Sarantakos 1997).

Semi-structured observations lie somewhere between these two extreme techniques and may be structured, for instance, in their approach but unstructured in their setting. They are relatively common in social research and combine advantages and limitations of both the structured and unstructured techniques of observation.

d) Natural observation and laboratory observation

The main difference between these two techniques lies in the type of setting in which they unfold. In the former, observations take place in natural settings; in the latter they are performed in a laboratory.

e) Open and hidden observation

This distinction refers to the degree to which the identity of the researcher as an observer as well as the purpose of the study is known to the participants. In open observations, the participants are well informed of the nature of the study and the identity of the researcher, in hidden observation they are not.

f) Active and passive observation

In active observations, the observer is involved in the process and purpose of observation. Active observation pre-supposes full engagement of the observer in

the cause of the study, while passive observation sees the role of the observer as being just a strict recorder of data.

g) Direct and indirect observation

Direct observation studies the subject it intends to explain; for example, if the study intends to explain the patterns of conflicts in marital homes, and observation involves married couples, this is a direct observation.

Indirect observation does not involve the object of study; either because the subject refuses to take part in the study or a direct observation is not possible (the subject is deceased). Instead, researchers observe the physical traces the phenomena under study have left behind and make conclusions about the subject.

Direct observation, if carried out in a structured and disciplined way is one of the purest forms of research, as it taps directly into behaviour, rather than perceptions, secondary or self reports of behaviour.

h) Self observation

This is getting respondents to observe themselves. This mainly involves the use of diaries, which respondents fill in whenever they do a certain activity, such as watching TV, reading a newspaper or buying something. This is not a very accurate method of observation because most respondents tend to forget to fill in the 4iary or deliberately do not do so.

i) Automatic observation

Often, observation involves counting the occurrence of a particular event. For the data to be usable it is often necessary to also count non- occurrences, so two counts need to be made at the same time. Without knowing the total number of people in a' group, the number that was doing one type of activity is meaningless, For example, you might want to count the proportion of people using hand phones

in the market place. To be able to calculate the proportion, you need to count both the number of people using hand phones and those not using hand phones.

4.2.5 Advantages and disadvantages of observations

Advantages

Observation as a method of data collection is generally considered to have the following advantages over other methods:

- When properly executed, observation provides unique insights not attained by other methods. It yields direct
- First- hand information, which is therefore more valid than reported information obtained from questionnaires and interviews.
- Observation provides a direct procedure for studying various aspects of behaviour and it enables one to code and record behaviour at the same time as it occurs.
- It employs a relatively less complicated and less time consuming procedure of subject selection.
- It can offer data when respondents are unable and/or unwilling to cooperate or to offer information.
- It approaches reality in its natural structure and studies events as they evolve.
- It shows the collection of a wide range of information, even when this information is thought to be, at the time of study, irrelevant. This is particularly true of participant observation.
- Observation is relatively inexpensive.
- It is the oldest method of research.

Disadvantages

Observation also has some limitations of which the ones listed below arc the most significant:

- It cannot be employed when large groups or extensive events arc studied. As Fantuzzo and Clement (1981) remark, it is rare to see observation used in

group designs because of its cost. In practice. observations use small samples, which reduce their internal validity and generalizability of their findings.

- Observation cannot provide information about past, future or unpredictable events.
- It cannot offer data related to frequency of behaviour.
- It cannot study opinions or attitudes directly.
- It is inadequate when studying certain phenomena such a sexual behaviour, family violence, etc.
- It is a relatively laborious and time-consuming method if it is to he properly executed.
- Observation is exposed to the observer's bias, selective perception and selective memory. The individuals doing the observation are almost always biased in what they are likely to pay attention to.
- In participant observation, the observer is a part of the situation that is being observed. It offers no control measure regarding bias, attitudes and opinions of the observer.
- It cannot offer quantitative generalizations on the results.
- In observation, a respondent may put up a show if she/he knows that a researcher is observing something.

Despite these limitations, observation is one of the most popular methods of data collection employed by researchers of both the quantitative and qualitative domains (Sarantakos, 1997).

4.3 Documentation

This method involves delivering information by carefully studying written documents, or visual information from sources called documents. These could be textbooks, newspapers, articles, speeches, advertisements, pictures and many others.

Ethnographic research

This is a very effective method but could be quite difficult and only experienced researchers can best use it. Ethnography involves, interacting with participants in their real life situations and for a longtime becoming part of them. It also involves participation, talking and doing things. The early European explorers and writers in Africa used this method quite a lot. In Ethnographic research, there are interviews, observations as well as group discussions.

There are three important ethnographic elements.

Explicitly purposeful

Here the researcher would have a specific purpose for the interview, observation or discussion and should make this clear to the informants / participants, the purpose of the interaction.

Ethnographic explanations

During the exercise, the researcher should make thorough explanations 'what the project is all about, statements about why the project is all out, statements about why the researcher is writing things down or e recording and so on.

Ethnographic questions

The ethnographic questions should be descriptive, aimed at eliciting respondents' perceptions of some aspects of their culture. These should be structured questions which help the interviewer discover how respondents organize or structure their knowledge and contrast questions which enable the researcher to discover the dimensions of meaning that respondents employ to distinguish the objects and events in their world.

4.4 The interview

4.4.1 Nature and Uses

An interview is an oral questionnaire where the investigator gathers data through direct verbal interaction with participants, for example, teachers, pupils and

parents. Instead of written responses, the subject gives the needed information verbally in a face-to-face relationship where the ideas are exchanged.

Interviews require the actual physical proximity of two or more persons and generally require that all the normal channels of communication be open to them. As a research technique the interview is a conversation carried out with the definite purpose of obtaining certain information by means of the spoken word.

The interviewer can explain the purpose of the investigation and can explain more clearly just what information he/she wants. If the interviewee misinterprets the question, the interviewer may follow it with a clarifying question. At the same time, the researcher may evaluate the sincerity and insight of the interviewee.

Interviews are particularly useful for getting the story behind a participant's experience. The interviewer can pursue in-depth information around a topic. Interviews can be useful as follow-ups to certain respondents to questionnaires, for example, to further investigate their responses.

Interviews are particularly appropriate when dealing with all types of persons, for example, young children, mothers, fathers, illiterates, those with language barrier, and those with limited intelligence. It is superior to other tools because they are flexible. For example, many on-the-spot improvements, explanations, adjustments or variations can be introduced in the data gathering process and through the respondents' incidental comments, using facial and bodily expressions, tone of voice, gestures, reactions, feelings and attitudes.

4.4.2 Preparing for Interview

Preparing for an interview requires the choice of an interview setting with little distraction for example; interviewer should avoid loud noise, lights and should ensure that the interviewee is comfortable.

Terms of confidentiality should be addressed. For example, who will get access to the interview answers and how the researcher is to analyze them. If interviewees' comments are to be used as quotes, interviewer must seek permission from them.

Interviewer must explain the format of the interview for example, the type of the interview and its nature.

Interviewer should indicate how long the interview would take for example, an hour, two or three or a couple of days.

Interviewer should ask for permission to record the interview for example, by using a tape-recorder or bring along someone to take notes (research assistant).

4.4.3 Conducting the Interview

Some common steps are identified in all forms of interviewing:

- Interviewer should contact the interviewee(s) and set up the time and a convenient place for the interview.
- Occasionally the interviewer should verify the tape-recorder (if used) is working. Interviewer should ask one question at a time.
- Interviewer should avoid embarrassing questions that probe into ones private life for example, pregnancy race, religion and national origin.
- Interviewer should attempt to remain as neutral as possible for example, he/she should not show strong emotional reactions to the interviewee's responses.
- Interviewer should encourage use of body expressions for example nodding the head, say "uh huh".
- Interviewer should provide transition between topics for example, "we have been talking about (some topic) and now I would like to move on to another topic'.
- Interviewer should not lose control of the interview especially when the respondents take long to answer a question or stray to another topic or begin asking the interviewer questions, which appear irrelevant.

Sequence of questions

Interviewer should get the respondents involved in the interview as soon as possible. Before asking about controversial matters (such as feelings and conclusions) the interviewer should first ask factual questions before getting into questions of feelings and emotions.

Interviewer should ask questions about the present before questions about the past and future. This enables the respondents to talk about the present and then work into the past and then the future.

After the Interview

Interviewer should verify if the tape recorder used, worked throughout the interview.

Make any necessary changes on the notes taken, for example, clarifying issues that do not make sense.

Interviewer should write down any observations made during the interview. For example, where it took place, and interviewees' emotions (nervous or aggressive surprises) that took place during the interview.

4.4.4 Types of interviews

Interviews vary in purpose and sequence for example; they may be conducted for guidance therapeutic or research purposes. They can be confined to one individual or extended to several people. And can be employed in qualitative and quantitative research.

a) Individual versus group interviews

When individual interviews are employed, the interviewer addresses the questions to one respondent at a time. Interviewer asks direct or indirect questions to one respondent who in turn answers them.

In group interviews, more than one respondent is involved in the interview situation. In a small scale group interview, two people for example, husband and wife, mother and daughter teacher and pupil are interviewed.

b) Single versus panel interviews

Apart from the number, of persons participating in the interview, as interviewees may be one and many, there may be variations in the number of interviewers also. It may be handled by one interviewer or by a panel of interviewers.

If the field to be covered is very vast and varied, it may necessitate that a panel consisting of various experts in the study area to be covered interviews the subjects.

Panel members can distribute and allocate functions among themselves.

For example, if a candidate is to be interviewed to judge her/his suitability for a post, it may not be possible for a single interviewer to do justice, therefore, a panel may be constituted.

c) Structured versus unstructured interviews

These two types are based on the nature of preparation for the interview and its actual execution. Some are standardized and formal; the same questions are presented in the same manner and order to each subject and the choice of alternative answers may be restricted to a predetermined list. Structured interviews are more scientific in nature than unstructured ones, for they introduce the controls that are required to permit the formulation of scientific generalizations.

The problem with this interview is that they have the necessity of collecting quantified, comparable data from all subjects in a uniform manner, which introduces rigidity into the investigation that may make it impossible to probe in

sufficient depth. Unstructured interviews are more flexible. Questions and the their order are not necessarily the same from one interviewee to another.

d) Semi-structured interviews

These lie between structured and unstructured interviews because they contain elements of both. While some are closer to structured interviews, others are closer to unstructured interviews. The degree to which interviews are structured depends on the research topic, purpose. resources and methodological standards, preferences and type of information sought. They are both used in qualitative and quantitative research.

e) Standardized and unstandardized interviews

These vary in terms of the degree to which the answer to each question is standardized. In the former interviews, the answers are determined by a set of response categories given for this purpose. Respondents are expected to choose one of the given options as the answer. An example of an option with two responses is "yes"'No" or "male"'female". An example with more response categories is "Kampala", "Nairobi". "Yaounde"'Accra" or "Strongly Agree, !Agree' 'Disagree' Strongly Disagree.

Unstandardised interviews are characterized by the fact that their responses are left open. The respondent is free to formulate responses the way he/she finds it most fitting (open questions in qualitative research).

f) Non-directive and focused interview

Non-directive or unguided interview is the most appropriate method for obtaining insights into hidden or underlying motivations; unacknowledged attitudes, personal hopes, fears, conflicts and the dynamic interrelatedness of responses.

The investigator permits the subject to talk freely while he/she serves as a good listener waiting to approve here and there or putting a generalized question to stimulate the flow of conversation. This helps the researcher to get the real picture of the subject's behaviour for example, the attitudes, motives, feelings and beliefs.

Focused interview focuses attention upon a concrete experience for example; if the subject has read a book, an effort is made to ascertain the specific effects that this experience has had upon her/him.

g) Unique and multiple interviews

Unique interviews take place only once. The interviewer approaches the respondent collects the information and concludes the interview the same time.

Interviewing a respondent for the second time is undertaken if the interview is incomplete or additional information is sought. Quantitative research use both types while qualitative prefer unique type of research.

h) Hard and soft interviews

Hard interviews are conducted in a form that resembles police interrogation, for example,: the interviewer requests information, receives it with some doubt and skepticism questions (mostly indirect) the validity and completeness of the answers obtained, often making the respondents not to lie and forcing them to give an answer which they hesitate.

In soft interviews, the interviewer holds a secondary position in the process of data collection, with the respondent being the major element of the process. The interviewer guides interviewee(s) through the process of interviewing without putting any pressure on them hence, a qualitative method.

These two types of interviews are mainly unstructured and Unstandardsed and allow the interviewer a high degree of freedom to manipulate the structure and conditions of the method. Openness refers to the degree to which the interviews are open to change and manipulation by the interviewer. They are open to changes and contain a minimum of control. Qualitative and quantitative researchers use open interviews although they are more common in qualitative studies.

j) Personal and non-personal interviews

Personal interviews are conducted in a face-to-face situation, usually with the interviewer presenting the questions and the respondent giving answers.

In Non-personal, there is no face-to-face relationship; interviews are administered though a medium other than the interviewer for example, via telephone or computer. Qualitative investigators commonly use personal interviews.

k) Oral and written interviews

By definition, all interviews are oral as such. This division does not seem to be of any significance. Quantitative and qualitative researchers employ oral interviews. Written interviews are predominantly, a method of qualitative investigators.

Oral interviews are administered orally and written interviews in a form that resembles self-administered questionnaires. For example, in group interviewing and in computer-aided interviewing questions are presented to the respondent in writing, often without oral intervention, and the answers are given in writing.

1) Analytical interviews

These are based on a theoretical foundation and serve to analyze concepts, theories, social relationships and events. They, demonstrate a trait of social research, which can be found in a number of interview forms. It is found more frequently among qualitative researchers, psychologists and sociologists.

m) Dilemma interviews

The interview guide and the order of questions are relatively firmly set, but they allow freedom and add supplementary questions. Interviewer presents the interviewee with a story or stories containing a decision or problem (dilemma), which they must solve and justify the suggested solutions.

During the interview, the researcher or an assistant records the responses. This can be done normally or electronically depending on the goal of the interview, solutions

and reasons given by the interviewee are considered and evaluated (qualitative method).

n) Biographic interview

An Interview form employed to study the life history of a respondent. It is often carried out in conjunction with documents analysis, and can take several forms some of which are very open, while others are relatively specific.

o) Computer interviews

Computer Interviewing is gradually becoming very popular because using computer is supposed to reduce the researcher costs significantly, provide a neutral interview environment particularly with regard to sensitive questions, anonymity and confidentiality and to aid significantly the grouping and analysis of the data.

4.4.5 Advantages and disadvantages of interviews

Advantages

1. The principal advantage of interviews is its adaptability. For example; a well-trained interviewer can make full use of the responses of the subject to alter the interview situation. The interview permits the researcher to follow up leads and thus obtain more data and greater clarity. For example, through careful motivation of the subject and maintenance of rapport, the interviewer can obtain information that the subject would probably not reveal under any other circumstances (Babbie 1990).

2. Interviews can create a right type of friendly atmosphere, which is very conducive for obtaining desired data.
3. Interviews can give assurance and guarantee to the interviewee that the facts will be properly used and safeguarded.
4. The flexibility identified in the nature of interviews enables the researcher to adjust the interviews to meet many diverse situations for example, language barrier, physical disabilities and others.

5. Interviews can be administered easily, for example, interviews do not require respondents to have the ability to read, write and handle complex documents or long questionnaires.
6. Interviewing is often perceived as a cooperative venture because personal contacts give personal emphasis. For example, if the person being interviewed is the person you had longed to see/meet then this can be an opportune time.
7. People are more willing to talk than to write especially on delicate, intimate and confidential topics for example, divorce, sex, separation, politics and religious affiliations.
8. The sincerity, frankness, truthfulness and insights of the interviewee can be better judged through cross-questioning and there is no chance for the respondent to rectify, modify and edit the earlier answers.
9. The investigator remains in command of the situation throughout compared to the questionnaire where it is normally out of the hands of the investigator the minute it is mailed to the interviewee. Interviews as data collection tools play an important role in the preparation of questionnaires and checklists, which are to be put to extensive use.
10. The interviewer has an opportunity to control the environment in which the questions are answered, channel/direct the reactions and comments of the respondent.
11. Interviews allow discussions of the meanings to the questions to eliminate ambiguity, provide an opportunity of correcting misunderstandings by the researcher and the respondents, which is not common with other forms of data collection.
12. Interviewers have control over the order of the questions whereby respondents have no opportunity to know what question comes next, or to alter the order of the questions they answer and there is hope that all the questions will be attempted.
13. Interviewers have control over time, date and venue because if an interview is to be held at the certain time for example, after the evening news or on Sunday after service, arrangements can be made.

Disadvantages

1. The flexibility, adaptability and human interaction allow subjectivity for example, when interviewers retain only that data which agrees or favours their own personal convictions.
2. Interviews are comparatively costly and time-consuming, often requiring a large number of trained field assistants and expensive equipment as tape recorders than other methods such as questionnaires.
3. The interactions between the respondents and the interviewee are subject to bias from many sources. For example, eagerness of the respondent to please the interviewer, a vague antagonism between interviewer and respondent, or the tendency of the interviewer to seek out answers that support his pre-conceived notions.
4. Interviews are less effective compared to other methods when sensitive issues are to be discussed. For example, many people prefer to write about such issues than to talk about them. In tape recording the interview, the interviewee can become cautious, scared and fail to avail interviewer with the necessary information.
5. Interviews are also affected by factors common to other techniques of data collection for example: deliberate misinterpretation of facts, genuine mistakes, and unwillingness, inability to offer information, interviewee's experience, judgment, accessibility and readiness to divulge the information and ability to express freely and clearly.
6. Interviews require skilled moderators and it is difficult to assemble data especially in-group interviews. Problems as to whether the group represents a larger population may arise.
7. Busy respondents prefer filling questionnaires at their leisure time than being subjected to long interviews.
8. It does not work well with some individuals for example: the infants, the shy people, deaf people and animals.
9. Some forms of interviews for example, structured require minimum interviewing skills and experience by the interviewer.

4.5 Discussion groups

Discussion groups are where a group is selected because of their particular interest, expertise or position from the society in an attempt to collect information on a number of issues. The group brainstorms on different solutions that can help to facilitate the group discussion on the issues at hand.

Discussion groups are mainly in two major categories namely; focus group discussion and nominal group techniques.

Focus group discussion

In Focus Group Discussions (FGDs) the group brainstorms on the issues but the conclusion of the group findings are not the outcome of the group consensus but a synthesis by the researcher.

Nominal group technique

Nominal Group Techniques (NGTs) are similar to FGDs, the difference arising in the consensus arrived by the group. In other words, findings are in agreement with every member of the group.

A focus group is a group that gathers people from similar background or settings or experiences to handle and discuss an issue or topic of interest to the researcher. It is not a group interview where the facilitator only asks the questions and the individual participants provide the answers. But focus groups are group interviews that are structured to foster talk among the participants about a number of issues. People are brought together and encouraged to talk about the subject of interest. Usually they consist of 6-8 people and a facilitator.

Group discussions are useful when the topic to explore is general and the purpose is to stimulate discussions from multiple views from the group participants so that the researcher can examine and internalize the different views.

In focus group discussion participants are given a chance to agree or disagree with each other so that they can reach a conclusion. In both qualitative and quantitative research, discussion groups are used as a tool of collecting data. During the collection, a facilitator follows a predetermined discussion guide to direct the discussion with the purpose of collecting in-depth information about a group's perceptions, attitudes and experiences in a defined topic or issue.

The participants should be of the typical interrelated population, for example, if the data is needed about the universal primary education performance, teachers and pupils should be the typical samples to participate in the group discussion. During the focus group interview a population format of the 'funnel' structure is applied. The beginning session is broad and less structured. The main aim is to hear participants' general views or perspectives. The middle session is more structured and the aim is to lead into, or begin to cover the topics of most interest to the researcher.

The ending session is narrow and the most structured. The aim is to obtain answers to specific needs assessment questions. In focus or nominal group discussion often the final question returns to broader and more general wrap-up/summaries.

The facilitator on both focus and nominal group discussion should write up on-site summaries as soon as the session ends. If these are going to be the primary source of data, they should be written with question-by- question format to capture what the group had to say regarding each topic or assessment question. Simple comparisons should be involved of what was said in their groups. The field notes taken by an assistant during the focus group session can support the site summaries.

The analyzed on-site summaries are important because they are used as a way of reporting focus groups data when only a brief report is needed. After conducting all the focus groups, the researcher should use the on- site summaries to synthesize themes of all groups. If the only method of collecting data for need assessment is

the focus group, a single brief report summarizing the themes should be produced. But when the assessment incorporates focus groups and other methods, like field studies and surveys, then a report will need to integrate findings from the different method for accurate conclusions.

Quantitative researchers have become interested in the use of discussion groups to collect data in recent years because the interactions among the participants stimulate them to state findings, perceptions, and beliefs that they would not express if interviewed individually (Cook and Reinharat, 1979).

Why use group discussions?

Group discussions have been widely used by social science researchers because:

- They allow flexibility of the members to discuss freely on an issue.
- Discussions allow participants to talk to members and facilitators directly, in that way, first-hand information is collected.
- In a group setting, people loosen up thus the interaction is free and the feelings, experiences and ideas are valued. As a result respondents express themselves more openly and data collected is true.
- Group discussions can lead to other methods of consultation as they provide background information that enables the researcher to formulate hypotheses for a more elaborate study.
- Lastly, group discussions provide many possible answers to specific questions as opposed to questionnaires that elicit specific answers for given questions.

4.5.1 Setting up discussion groups

Group discussions are widely used in social sciences research. Therefore, in focus group or nominal group techniques, the factors that determine success, that is, reliability and usefulness of results have been extensively researched and analyzed. When setting up a discussion group, the following points have been highlighted:

- Be clear about the purpose of the discussion.
- Write a general-purpose statement.

- Let group members and others who are to use the information know about the problem statement.
- If necessary, refine it to have one that is applicable to every member.
- Formulate the guidelines to be followed during the discussion.
- Involve the target group or sample.
- Name the group leader/facilitator.

4.5.2 Recruitment/selection of participants

The participants should belong to the same socio-economic status or have a background having relation to the topic under investigation.

The age and sexual composition of the group should enable free discussion. The information on a topic being studied should be obtained from different source of participants who are likely to discuss from different perspectives in small discussion groups that may be combined at later stage.

The participants should be informed when to meet two or three days in advance and the modality to be used explained to them so that they develop interest and reflect on the discussion.

Selection of respondents is done through a random procedure, systematic or cluster sampling or other ways that can be justified by the objectives of the study and nature of the respondents.

The researcher may have to rely on the key people for the first selection of participants when new in the area of research. These people should be explained the purpose and process of the discussion so that they can suggest some individuals that can be invited for the discussions. During the explanation the researcher points out important issues of what group of persons are needed for enabling proper and an enriched discussion.

The participants in the first group discussion can therefore assist to find relevant persons for other groups.

Also the way the participants are selected may be in some systematic way taking for example, every 5th male or 3rd female the researcher comes across. The size of the group discussion should range from 6-8 and should be knowledgeable and interested in the research topic.

4.5.3 Guidelines for conducting group discussions

For the success of a discussion group the following may be considered:

- The recommended group size above should allow everyone to participate freely, providing a diversity of views.
- Selecting group members who represent the target population help to create sense of comfort and compatibility among the participants.
- Choose a facilitator/leader who is knowledgeable in group networking techniques and who can encourage participation and interaction among members.
- One who is acting as a recorder or observer should record all comments made by the group as be/she notes important gestures or feelings during the discussion.
- To check on the consistency and reliability of the group findings use more than one group discussion.
- Avoid asking questions irrelevant to the findings. This requires keeping closely in mind to the objectives of the study when designing the discussion guides.
- When designing a discussion group take note of who the participants are? How you w recruit and select them; what questions to be asked: how to moderate the groups; collect data and analyze the data and finally report the data.
- Questions must locus on the general and specific objectives. When the questions are all general, participants may not pay attention to more specific issues. On the other hand if the questions are all specific the information got

will not focus on the broader perspective of the topic. The questions must be followed by probe for the participants to capture a large area of responses.

- The use of audiovisual or videotapes constitute the primary source of the group discussion data. If the discussion is video taped then make sure that these videotapes do not contain data that are irrelevant. That is when listening or viewing the tape can show whether a statement was just a joke, how the discussion was or what was taking place was merely exchange of words.

Preparation of discussion guide and conducting the discussions

A guide, containing the topics to be discussed is written for all members to access easily. This can be done in form of open- ended questions, which can vary from group to group.

The discussion guide should be so flexible that every member of the group generates responses to create diverse information. The guide must be clear and precise so that it foster communication and interaction among members during the discussion.

How to conduct the session

Once the discussion group is set up and all other physical arrangement are made, then the session begins but the leader/facilitator should be chosen not from the group members but may be chosen from the research team, must be quite knowledgeable about group networking tactics, and have the ability to develop a warm atmosphere among members of the group.

The facilitator if possible, should have characteristics close to those of the participants like age bracket, education, sex etc. Also there should be one member to serve as a recorder.

The facilitator has a number of duties that include

Beginning the session

The facilitator must introduce himself/herself to participant and then introduce the recorder. After this, the participants introduce themselves with their names or names they want to use during the discussion. The facilitator explains the purpose of discussion group, kind of information needed, and how the information will be used. If there is going to be the use of tape-recorder, seek the participants' permission. Allow informal discussion before the actual session starts.

The facilitator should encourage the continuity of the discussion by himself being enthusiastic, lively and humorous when talking and showing interest in the group's ideas.

The facilitator should try to formulate questions that encourage as many participants as possible to air their views. There are no right and wrong answers; create a neutral position when reacting to both verbal and nonverbal responses.

The facilitator should also encourage involvement of the participants by not using question and answer sessions. Techniques should be applied which require the group members to give examples of the points they are trying to make, Always redirect back the discussion once it is off the track. This can be done by use of the participants' answers to direct a question to another so that the topic is maintained. Avoid eye contact that may discourage some persons from speaking; this is mostly with participants who tend to dominate the discussion.

For the reluctant or inactive participants use of eye contact or calling his/ her name as you request for his/her• opinion will encourage his/her participation.

Also the facilitator can form sub-groups so that a member of the subgroup summaries and presents the opinions of their sub-group and after which the group can discuss there opinions.

The facilitator should build rapport among the group members as this encourages participants to give more responses without difficulty.

Observe non-verbal communication of the participants, what are they saying? What does it mean? Also be aware of your own voice tone, facial expressions, body language and those of the participants.

When asked question, try to direct back the question to the group for their opinion, do not assume to be the expert and avoid commenting of what is being said.

Listen carefully and make sure that you follow from topic to topic but allow the topic to continue for sometime if the participants jump to another topic because this may lead to new information important to the topic under discussion.

Control the time allocated to various topics to maintain the interest of participants.

The facilitator should take time to summarize at the end of the meetings, to check for consensus and thank the participants for their contribution given during the discussion. Facilitator should pay attention to the comments and informal discussion that occur after the meting has been closed.

The duties of recorder

The recorder keeps all records of the content of the discussion as well as document emotional reactions and other important aspects of the group interaction. Assessment of the emotions of the meeting and the group process will help the researcher to judge the validity of the information collected during the group discussion.

Aspects that can be recorded include

Data, time, place, names of participants, characteristics of participants, opinions, emotional issues (i.e. reluctance, dominance), new terms of vocabulary used etc.

The use of a tape-recorder is to assist the recorder to capture all the verbal discussion but the recorder take notes as well. Sometimes two recorders can be

used once there is no tape-recorder. Finally, the recorder should keep on reminding the facilitator what has been missed in the discussions.

Number and duration of sessions

The number and duration of group sessions depends on the researchers urgency of the information, resources, need for more information. However, the first group discussions usually last about one hour but later sessions are usually shorter.

4.5.4 Advantages and disadvantages of group discussion

Advantages

The group discussion has a number of advantages that include:

- As a pre-research method it can help to prepare the main study by providing sufficient information about the topic under investigation. It can be used for operationisation of the study by defining indicators and preventing the possible error.
- As a post-research method it can explain trends and variances, reasons and causes through the views of the participants.
- The method brings about changes in the group and its members by making them become knowledgeable in the topic that was discussed.
- The rapport between the facilitator and the group members can encourage participants to express their feelings without difficulty.
- Spontaneous comments and new perspectives can be explored easily, resulting in the generation of new ideas.
- Group discussions allow interaction among members such that they are able to build on each other's ideas and comments to provide an in-depth view, which is not attained through individual questioning.
- Group discussion can give insights of diverse views not just what participants think or believe about but also why they think the way they do.
- Group discussions lead to consensus and diversity of participants' needs, experiences, assumptions and preferences.
- Group discussion target groups that are sometime left out during the consultations such as disabled people, women and the younger people.

Disadvantages

They include the following:

- Group conditions might oblige people to hide their real opinions especially if their views can have effects on their personal life.
- Some member's dominance of the discussion might affect the direction and outcome of the discussion.
- Success of the method relies very much on the qualities of the facilitator and the composition of the group.
- Some members of the group may not participate in the discussion.
- There are problems with recording the data as a lot of views are generated and the recorder cannot take up all at once. Sufficient recording equipments may not be available.
- It may be difficult to keep the discussion on track and also due to diversity of information, the follow up action may be difficult.
- The group may like to please the facilitator and consequently the information collected may be biased by subjective interpretation.
- It generates a large amount of data that is often difficult to analyze.
- The findings are not representative as small samples of participants are selected, in this case, views of participants may not represent the majority of the population.
- All participants need to gather in one place at the same time for he discussion and this may be difficult due to different backgrounds and occupation of participants.

4.6 Case studies

Case studies make an intensive investigation on the complex factors that contribute to the individuality of a social unit. They emphasize detailed contextual analysis of a limited number of events or conditions and their relationships. By so doing. case studies bring about an understanding of a complex issue and can extend experience or acid strength to what is already known through previous research. Case study

research method has been used for many years in a variety of disciplines. In particular, social scientists have used this qualitative method to examine contemporary real-life situations and provide the basis for the application of ideas and extension of methods.

While some critics of the case study method argue that the study of a small number of cases offers no grounds for establishing reliability or generalizability of findings and that the intense exposure to study of the cases biases the findings, others insist on case study research as useful only as an exploratory tool. However, researchers continue to use case study method with success in carefully planned studies of real-life situations, issues and problems. The present section attempts to explain the nature, the different scenarios as well as the advantages and the disadvantages of case studies, including generalizability of results.

A case study research method has been defined as 'an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidence are used' (Yin, 1994). Different authors have endeavoured to define and describe the nature of case studies. Such definitions and descriptions show that authors may differ on certain concepts while agreeing on others.

A case study is a detailed examination of one setting, or a single subject, a single depository of documents or one particular event (Srassetal, 1990). A researcher explores in depth a program, an event, an activity, a process or one or more individuals often in their natural environment and for a long period of time.

Thus the case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time (Strassetal, 1990). A funnel can be considered as the best representation of the general design of a case study in the sense that the start of the study is the

wide end, which is narrowed down by developing a focus where there will be an exploration in depth.

The data collection and research activities narrow to particular sites, subjects, materials, topics, questions and themes. From broad exploratory beginnings case studies therefore move to more directed data collection and analysis.

A case study is concerned with everything that is significant in the history or development of the case (Best and Khan, 1998:127) in the sense that the present phenomena can be understood in view of its past. It is intended to understand the life cycle or an important part of the life cycle, of an individual unit and this may be a person, a family, a group of social institutions or an entire community.

Case studies probe deeply and in an intense manner, analyze interaction between the factors that produce change or growth. While emphasizing the longitudinal or generic approach, case studies show development over a period of time. Despite the fact that case studies are usually referred to as a method of data collection and are also discussed together with other methods, many researchers tend to conceive them as a model or design that deals with all aspects of research.

4.6.1 Case study as a scientific technique

To be accepted as a scientific technique, case studies must meet the following criteria common to other research methods:

1. Cases are selected, which exemplify the problem area under investigation. A researcher should restrict the study to the thorough investigation of a few cases and since case studies cover many aspects of the total picture and extend over a long period of time, they are consequently time consuming and costly.
2. Hypotheses are formulated from past experiences and researches with similar cases, symptoms and antecedents arrived at by means of incidental or systematic observation or both.

3. The investigator collects relevant data, observes behaviour, administers tests and examines products. Data collection techniques involve interviews, tests and other data gathering devices and techniques designed to provide information on the individual's life history, his health history, his scholastic history, his home and community background etc, in order to clarify the problem under investigation. Collected data is verified and interpreted in such a way that it is dependable and understandable.
4. Tentative diagnoses of the likely antecedents of the difficulty are made. This consists in evaluating the data collected, comparing it with past experiences and norms, and making a decision concerning the inadequacy of the data that seeks to explain such a situation.
5. Instituting remedial action after re-examining the past experience and scientific investigations relating to the course of action is another principle underlying a case study.

Good case studies should be based on adequate and complete data, have valid data and objective data.

4.6.2 Different scenarios in case studies

Different scenarios of case studies may emerge. For instance:

a) Historical organizational case studies

Historical organizational case studies concentrate on a particular organisation over time, tracing the organization's development. One can, for example, trace the beginning of an organisation and the changes, which have taken place over time to the present. In such cases data sources like interviews with people who have been associated with the organisation, observations of the present organisation and the existing documents are indispensable.

To undertake such a study, it is necessary to first of all check on who is available to interview and what documents have been preserved. If in many instances historical organizational case studies become impossible to undertake it is due to insufficient sources for a minimally acceptable piece of work.

b) Observational case studies

In observational case studies, the major data-gathering technique is participant observation. The study focuses on a particular organisation or some aspect of the organisation. The following are parts of the organisation that become foci in organizational studies: a particular place in the organisation like a classroom in a school or the office of the Secretary; a specific group of people in the organisation like lecturers / teachers, and some activity of the organisation like academic evaluation of students. However, one can focus on a combination of the above listed aspects.

The size of the group to be studied also plays a very important role in observational case studies for, the smaller the number of subjects in a group the more likely the researcher is to change their behaviour by his presence. On the contrary, a larger number of subjects usually makes it difficult to keep track of everyone and to manage all the data and relationships present.

c) Case studies of life history

In life history case study, the researcher conducts extensive interviews with one person for the purpose of collecting a first hand narrative. When historians do such an interview, it is referred to as oral history. Historians interview different categories of people and in different social groups to get the details of their history. In life history case studies, emphasis is put on different issues like the role of the organisation, crucial events, the lived experience of the narrator and how that relates to other factors like gender and social class.

d) Documents

Documents commonly refer to materials that are used as supplementary information in case studies whose main data source is participatory observation or interviewing. Qualitative researchers are increasingly using them as their primary source of data partly as a result of a discourse theory developed in literature

departments or in cultural studies (Bogdan and Sari, 2003:57). Documents can be divided into three main types:

- Personal documents or narratives which are produced by individuals for private purposes and having limited use such as letters, diaries, autobiographies, family photo albums and other visual recording.

- Official documents produced by organizational employees for record-keeping and dissemination purposes such as memos, newsletters, files and yearbooks which are used to study bureaucratic rhetoric.

- Popular Culture documents produced for commercial purposes to entertain, persuade and enlighten the public such as commercials, television programmes, news reports or audio and visual recording. Photographs of all types have also a substantial researcher clientele.

e) Case Studies in qualitative and quantitative research

Case studies can be used in both qualitative and quantitative research to a different extent and for different reasons. They are more popular and also assigned more value in qualitative than in quantitative research. When employed for purposes of exploration case studies are intended:

- to gain more information about the structure, process and complexity of the research object when relevant information is not available or sufficient;
- to facilitate conceptualization;
- to assist with formulating hypotheses;
- To guide the process of operationalisation of the variables.
- to illustrate, explain, offer more detail or expand quantitative findings and
- to test the feasibility of the quantitative study.

This implies that in quantitative research case studies are used as a prelude to the real research; as a form of pre-test; or as a post research of the 'main study. In

qualitative research, however, case studies do not necessarily serve as a supplement to quantitative studies but rather as a research enterprise of their own for the development of hypotheses or even theories.

4.6.3 Advantages and disadvantages of case studies

Advantages

A case study is a useful mode of investigation into the causal relationships of complex social phenomena. It is also employed in studying the general characteristics of phenomena of any given group like the difficulties students face in registering in the university and whose findings may form the basis of guidance in preventing maladjustment.

Since a case study makes an intensive investigation on the complex factors that contribute to the individuality of a social unit, a person. family, group, social institution or community in order to understand the life cycle or an important part of the life cycle of that particular unit, it is potentially the most valuable method known for obtaining true and comprehensive picture of individuality.
As a form of qualitative analysis involving a very careful and complete observation of a person, a situation or an institution over a period of time, that explain present status or that influence change or growth.

The case study method is popularly used to build upon theory, to produce new theory, to dispute or challenge theory, to explain a situation, to provide a basis to apply solutions to situations, to explore, or to describe an object or phenomena.

Advantages of case studies also include especially its applicability to real-life and contemporary human situations as well as their public accessibility through written reports. The results of case studies relate directly to the common readers everyday experience and facilitate an understanding of complex real-life situations.

Disadvantages

In the strict sense, case studies are the onset of generalizations yet a generalization drawn from a single case or a few casually selected ones can hardly be applicable to all cases in a population. It is not easy to select subjects or units for a study that are representative or typical.

A researcher is, therefore, faced with a problem of choice of a particular unit for case study and at the same time suffers the problem of the of generalizability of the resulting analysis. And since generalizability is questionable, the researcher is likely to be challenged in making general statements about the results. The tendency is either to abstain from making a decision for a study or to let the reader draw their own conclusion concerning the generalizability.

There is also a problem of what may be called 'internal sampling'. This has to do with the decision to select given units for the case study.

Other challenges result in the nature of the subjects themselves. Some arc more willing to talk and have greater experience while others lack insight of what goes on and are more reserved.
There is a risk of collecting data that is a product of errors of perception, faulty memory, deliberate deception, unconscious bias, the subject's desire to present the right answer, and the tendency to over emphasize unusual events or to distort them for dramatic effect.

The choice of time for carrying out the study is also an important factor, Qualitative researchers must therefore make clear decisions in the context of the study not only relating to the choice of informants but also to the allocation of time as well as the duration set aside for the study.

The case study method tends to look deceptively simple, to the extent that to use it effectively, the researcher must be thoroughly familiar with the existing theoretical knowledge of the field of inquiry and skilful in isolating the significant variables from

any that are irrelevant. The case study process, therefore, is susceptible to a fallacy in the sense that effects may be wrongly attributed to factors that are merely associated rather than cause and effect related.

Exploratory designs

Exploratory research can take many forms, depending on the nature of the main study, the purpose of the research, the study object, the state of knowledge in the area of investigation and more specifically, on the purpose of the exploration.

As prelude to as quantitative study, exploratory research takes four main forms; namely review of available literature, expert surveys, analysis of case studies and pilot studies.

Literature review

This involves a secondary analysis of the available information already published in some form. It can be a study of research object done with the aim of collecting relevant information about its structure, process and relationships, increasing the familiarity of the researcher with the research object thereby establishing the credibility of the project. In addition, literature review can consider previous research and attempt to link it with the study at hand or planned.

It may explore a theory or the methods and techniques most suitable for the study simply by looking at the ways other researchers have approached the topic and thereby be able to evaluate their suitability and effective in that particular study.

Expert surveys

This involves interviews with experts who have substantial knowledge and experience in the research area although their findings might not lye been

published yet. Such exploratory information may be quite relevant to the study and can be obtained through interviews.

Case studies as exploration

Analysis of case studies can serve exploratory purposes as well as studies selves. But generally, case studies can be helpful as an avenue of exploration.

Pilot study

Exploratory research can also take the form of pilot study that ideally, is a preliminary trial of research measures and techniques essential to the development of a sound research plan. In a pilot study, the entire research procedure is carried out including analysis of data collected, following closely the procedures planned for the main study. A case study is beneficial in the sense that:

- It permits a preliminary testing of the hypotheses in the main study. This may in turn lead to changing the hypotheses, dropping some and/or developing new hypotheses if deemed necessary.
- It often provides the researcher with ideas, approaches and clues not foreseen prior to the pilot study. These ideas and clues may increase the chances of obtaining clear-cut findings in the main study.
- It permits a thorough check of the planned statistical and analytical procedures that allow appraisal of their adequacy in treating the data.
- It reduces errors because unforeseen problems revealed in the pilot study may be overcome in redesigning the main study.
- An exploratory research carried in form of pilot study saves the researcher such expenditures as time and money. Carried out in the field or laboratory, the pilot study almost always provides enough data for the researchers to make a sound decision on the advisability of going ahead with the main study.

- In many pilot studies, which are a form of exploratory research, it is possible to get a feedback from research subjects and other persons involved and

which leads to important decisions and improvements in the main study. Although the pilot study is supposed to follow the main procedures for the most part, there are sometimes variations like trying alternative instruments and steps as well as seeking feedback from subject on treatment, measures and other aspects of the research usually desirable. When deciding what variations are appropriate, one should bear in mind that a pilot study is not an end in itself but it is only a means by which the main study can be improved.

- In the pilot study, the researcher may try different measures and then select only those that produce the best results.
- Pilot studies can give a detailed description of a proposed study designed to investigate a given problem, including justification or the stated hypotheses to be tested, a detailed presentation of the research steps that would be followed in collecting and analyzing the required data within a projected timeframe for each major step.

4.7 Field studies

Although field studies are usually referred to as a method of data collection and are also discussed together with other methods, for many researches, they are a research model or designs that deals with all aspects of research (Keeves. 1988).

Field studies have recently become more popular and more frequent in the area of social sciences and are expected to expand further in the future. As independent methods they arc promising because of the type and quality of work they produce. As exploratory studies they are useful for providing the foundations for more extensive qualitative and qualitative studies.

4.7.1 The nature of field studies

Field studies are a form of social enquiry into real-life situations. Field research takes place in the field or in a natural setting that is not established for the purpose of conducting research. In most cases also, respondents do not know that they are being observed.

Field studies take place over a long time and generally involve primary relationships between the observer and the person being observed. Such relationships involve not only emotions such as love and hate on the part of the person being studied, but also the emotions of the observer. This helps the researchers to analyze and explain the behaviour of those being studied. The researcher should also keep in mind the biasing effect of his/her emotions and feelings.

Field researchers begin with some general notions or tentative hypotheses formulate questions, accumulate data that may support or eliminate guesses maintained so far and where supported guesses become formal hypotheses and the researcher begins to centre around them, eventually leading to tentative conclusions and to propositions.

The term "field study" is often used simultaneously with the term 'ethnographic study" or "ethnography". Unlike what was previously believed about field studies as a kind of soft-option research with a relatively low status and lack of vigour, producing biases and sloppy results, now field studies are considered to be demanding and useful as any other method of social research.

Field research employs a number of techniques of data collection and analysis. The most important element of this type of research and its central design is the underlying theory, which integrates the field and the selected methods into a meaningful tool for social investigation.

4.7.2 Purpose of field studies

Field studies explore real-life situations, studying behaviour patterns and the reasons behind social interactions.

Field studies explain and categorize social events. They help understand the dynamics of a socio-cultural system and how people interpret their world. It aims at emancipating, empowering, and liberating people. It has the purpose f

understanding people and their social environment and of explaining the social justification of their role and position in that culture.

4.7.3 Steps in field studies

The following are important steps to follow in field studies:

1. In the first place, the researcher decides on the goals of the study including the statement and description of a particular context of the field study as completely as possible.
2. Deciding on the type of group to study
3. Gaining entry to the group to be studied. When the researcher tries to gain entry, he/she generally has some problems of legitimizing himself/herself. One of the ways to gain access is through friendship with the person or group to be observed.

A better way to go about field entry is to have an affiliation with a local university or research organisation that gives the researcher a purpose for conducting the study. He/she should have credentials that show that they are capable of conducting research and a letter of identification that shows that they are legitimate and have no interior motives such sales or burglary.

The use of a middle-person is helpful. This is the person who knows both the researcher and the informant and can introduce the two to one another.

4. The 4th step is gaining or creating rapport. This can be the most difficult and time-consuming task in field research especially in an atmosphere laden with suspect.
5. Observing and recording. This follows the step of gaining rapport. During field studies the researcher takes field notes. Field notes inevitably combine two elements. What seems important to those in the field (the people being studied) and what seems important to the researcher himself/herself.

Most observers prefer, if possible to jot down notes during the day and write full field notes at night. It is sometimes possible to use recording devices during the day and transcribe the tapes later.

It is advisable to record the notes as quickly as possible after observation. Although typing field notes is preferable to handwriting because it is faster and easier to read, especially when making multiple copies this is not often practical for lack of typewriter and computers.

6. The 6th step is dealing with crisis: According to Wax (1971), even under the best circumstances, an impartial study of any institutions or social system is going to be perceived by its officials as criticism.

It should also be noted that confrontations between the researcher and those being studied is not unusual. When perhaps fear is present, the field study may be4 misunderstood by the officials and functionaries of the institution or social system as criticism. Those in lower level- employment may confront the researcher as being a management spy. The following strategies may be adopted:

1. Appear humble and powerless so that persons in the organization being studied will not perceive you as a threat.
2. Appear so powerful and prestigious that authorities and others fear to challenge you. Gaining support of high officials who have a great deal of political power can do this.
3. First enter the research setting and then align yourself with the most powerful group operating within the setting.

7. Step 7 is Data analysis: Analysis and writing up the Report is another very important step in field studies. The main job of data analysis in field studies consists basically of summarizing the field notes by means of taxonomies or flowcharts.

4.7.4 Problems in field studies

- Field studies take long to accomplish. This affects other activities that the researcher and other people associated to the field studies may need to. For example, the researcher may be a worker who might have obtained permission to take only one month to do the research and the study takes more than the time obtained.
- There are dangers of bias from the limitations of what can be seen, especially by strangers, and from accepting the opinions of a limited number of informants at the face value.
- Note making is tedious.
- Entry to the community is very difficult. It can be several months; some people never manage to overcome resistance and achieve enough acceptance to carry out their work effectively.
- The researcher must go through a long process of socialization into the community gradually developing contacts and gaining acceptance. Difficulties are increased if the culture and language are new.
- The personality of the researcher may affect interaction with the community.

- The researcher may face the danger of associating with a person who might have been rejected by the community members for deviant behaviour. Such people are not representative of the community as a whole. Associating with them may then result to sanctions.
- The problem of inequality may arise as researchers are seen to he wealthier than those observed. This affects their relationships, since exchange is an important factor in social life. Gifts should not he seen as payment as the community will have a tendency to demand more and more payment before they can release any information or offer any assistance.
- The presence of an observer will have some effect on group activities, especially when using a tape recorder, camera or other device.
- The researcher may become the centre of attraction or leader. It I important for the researcher therefore, to note that his/her posit iofl is essentially that of a learner and not a teacher.

- The unusual is often more noticed than the things which happen everyday. This means that field notes may put considerable emphasis on untypical events and neglect activities, which are basic 10 community interaction.
- Cultural differences between the observer and those researched on can lead to misinterpretation of what is seen. This is more difficult to guard against when the differences are minimal such as in urban African setting, villagers or people who are of a related ethnic group.
- In line with the above problem, there is a possibility of committing two fallacies i.e. the fallacy of non-observation or the fallacy of mal-observation. The fallacy of non-observation is committed when relevant facts are overlooked i.e. when some of the relevant facts remain outside the observation. The overlooking of certain instances may be due to inadequacy of knowledge, suspicions, habit or preconceived notice. The fallacy of mal-observation arises out of the wrong interpretation of the sense perception. When observation is interfered with, unconscious inferences or mal-observation may occur. It is due to misinterpretation of our perception.

4.7.5 Advantages and disadvantages of field studies

Advantages:

Field studies have many advantages including:

- Development of hypotheses. One of the uses of field studies is to help in development of hypotheses.
- It has a large range of the information it provides because of the length of time taken to gather information and the different approaches it employs to obtain information.
- Strangers working outside their own society are socialized.
- There is no need to specify the research problem as clearly as someone designing a survey but can be flexible, examining events as they happen, trying to understand how social relations reflect values and beliefs and the meanings people give to what they do.
- In-depth studies can be carried out as field researchers develop questions which need answering and direct further observations into these areas. This is a way of discovering more about the issues under research.

- Field studies do not only consider the economic, social, political aspects but the cultural implications of the questions and answers. This makes field studies more adequate than any form of studies.
- An outsider can never be as full a member of a society as someone who has grown up in it, but by participating over an extended period, some of the gaps in knowledge can be filled.
- Participants observers can have a full understanding of a society than those who appear, take a survey and leave.
- The rules of interaction, the way relationships are structured and the effects of these on behaviour, the way members perceive and experience their culture, the standard of living and quality of life, all need in-depth studies carried out in field studies.
- Extensive reading and informal conversation with members of the society can be a partial substitute but in-depth studies, which include observation are very good at obtaining extra information.

- Field studies are good for studying attitudes and opinions. The predisposition to behave or react in a certain way can easily be studied over time.

Disadvantages

- Formal informant interviewing requires considerable preparation.
- Extensive reading and thought about what questions to ask is needed so that informants do not consider the researcher as a novice wasting their time.
- Because of the time it takes, it is costly in terms of time and money. It requires personal sacrifice.
- Because the research problem is not specified at the time of setting out for field study, there is a risk of collecting irrelevant information which will not be used.
- There is danger of being completely rejected by the natives if thc researcher is an outsider.
- In field studies, the researcher has to wait until the phenomenon or event to be studied occurs. For example if the researcher wants to study the

circumcision practices among the Bagisu, a tribe in Eastern Uganda, he/she has to wait for that period of the year.

- The subjects may modify their behaviour once they get to know that they are being observed. This results in obtaining invalid result.

Review Questions

1. Discuss the uses and procedures of observations as data gathering methods.
2. Analyze the different types of observations techniques.
3. Distinguish between ethnographic and interview studies.
4. Analyze how you would conduct an interview.
5. Discuss the different interview types indicating their advantages and disadvantages.
6. In general interviews as research tools have both advantages and disadvantages. Discuss them.
7. Why would you use a Focus Group Discussion as data gathering technique?
8. Discuss how you would set up[and animate a Discussion Group
9. Discuss the different types of case studies analyzing their advantages and disadvantages.
10. What is the principal focus of exploratory studies.
11. Analyze the advantages and disadvantages of field studies.

Unit 5
Quantitative Designs
5.1 Introduction

As seen earlier, quantitative research refers to the type of research that is based on the methodological principles of positivism and neopositivism and adheres to the standards of strict research design developed before the research begins.

Quantitative designs are plans for carrying out research oriented towards quantification and are applied in order to describe current conditions or to investigate relationships, including cause-and-effect relationships.

Methods of data collection employed by quantitative researchers are many, diverse, simple and straightforward. The most common methods are surveys, documentary methods, observations, socio-metry and experiments.

Quantitative researchers, attempt to control as many variables as possible. They therefore, prefer research strategies such as random assignment and random sampling, use of standardized instruments and when appropriate, an equalizing of conditions of groups to be compared (Young
1975).

The Research design

After formulating the research problem in clear-cut terms, it becomes necessary for the quantitative researcher to prepare a research design.

The research design is the plan for carrying out a research project.

In fact, a research design is the conceptual structure within which the quantitative research is conducted and constitutes the blue-print for the measurement of variables collection and analysis of data.

The research design includes an outline of what the researcher will do from writing or formulating the hypothesis to the final analysis of data. The design decisions try to answer the following questions that may be encountered by the Researcher:

- What is the study about?
- Where will the study be carried out?
- What type of data is required?
- What periods of time will the study include?
- What will be the sample design?
- What techniques of data collection will be used?
- How will the data be analyzed?
- In what style will the report be prepared?

A research design is needed because it facilitates the smooth sailing of the various research operations thereby making research as efficient as possible and yielding maximal information with minimal expenditure of effort, time and money.

Just as we need an architectural plan for a more economical and attractive - construction of a house, we need a plan or design of data collection or analysis of our project in terms of manpower, resources, keeping in mind the objectives of the research, availability of staff and data, time and money.

The research design is a significant step / element in the quantitative research process. It is the step where all the research is designed, options considered, decisions made and details of the research laid down for execution. The design should contain, among other things, the logical sequence in which the study is to be carried out, as well as the elements of the study, its sampling procedures, methods of data collection and analysis and all administrative procedures that need to be considered for the study to be carried out without problems or delays.

The following should be considered in the preparation of the research design:

- The means of obtaining the information.
- Availability and skill of the researcher and his staff.
- Explanation of the way in which the selected means of obtaining information is to be organized.
- The time available for research.
- The finances available for the study.

Additionally, the following points should be considered:

- Sampling procedure: The researcher decides on whether to study the whole population, that is a census or only a sample
- Data collection: The method of data collection to be used in the study should be considered with care and such a method should be one that facilitates quantitative research.
- Data analysis: Here, the different statistical techniques of analyses and interpretation of the data are envisaged.

Reporting the results: At the design stage, decisions are also made about the form in which the results will be published. This could be in the form of a report, journal article, a dissertation, a thesis or a book. It is also at this stage that publishers, editors of journal and state departments interested in the report are contacted to facilitate reporting.

The following are quantitative research methods:

5.2 Categorization of quantitative designs

Quantitative approaches to research are generally categorized as Descriptive, Correlational, Experimental and Causal-comparative research. These main categories also have their breakdowns.

Descriptive research

Descriptive or cross-sectional studies are those studies, which are concerned with describing the characteristics of an event, community or region, providing data about the population or item being studied by only describing the who, what, how, when and where of a situation at a given time but does not go into finding what causes or caused it. In this way, it aims at providing a systematic description that is as factual and as accurate as possible In general, descriptive research aims at complete enumeration. Moreover, there are several variants of it.

Cross-sectional survey method

The cross-sectional survey is perhaps the most commonly used research method in social research. Surveys are used to gather data from a sample of a population at a particular time.

Example 10.1

A researcher may conduct a survey to find out the opinion of a cross- section of the population about UPE or why girls are dropping out of schools in a particular part of the country. Surveys may be carried out to obtain information about preferences,

attitudes, practices and concerns or interests of a group of people on the above issues. The results are then extrapolated to the entire population.

Surveys may vary in the levels of complexity from those, which provide simple frequency coun5 to those, which present relational and multilevel analysis.

Longitudinal studies

In longitudinal research' the status of time is emphasized and the study of a phenomenon is over time and related to constancy and change. Where repeated observations are made of individuals or groups in order to describe or explain both stability and change, time acts not only as the logical link between the repeated observations but also as a variable that is characteristic of the 1fldviduals or groups.

The use of time in longitudinal studies takes place in two distinct ways:

First, time is used as a characteristic of the research subject. For example, when chronological age is employed as the basis for the selection of an individual or a group for study or when the members of an age cohort are studied at successive intervals during their life span.

In addition, in retrospeti1e studies, events that occurred at particular times in the life of an individual group or community are not only readily identified but may also have special significance. A major limitation on the use of time in this 4vay is that it is not a manipulable variable and subjects cannot be assigned to different time values.

The second use of time is as a design characteristic, which occurs in learning studies, when the extent of learning is measured after successive time periods. This implies that, in this use, time is an alterable variable and the effects of time tire amenable to analysis.

The strength of time as design characteristic arises from the increasing recognition that the effects of environmental and intervention influences are time related, so far as exposure to the environment or to the intervention has significant consequences.

Perhaps the most significant characteristic of time lies in its relationship to causal influence since earlier events influence later events but not vice versa. Thus while it cannot be assumed that measurements made on a variable obtained a an initial point of time can be causally related to an outcome measure obtained at a later time, it is clear that unless the appropriate time sequence exists, it is not possible to organize logically for a possible causal relationship.

Types of longitudinal research

Inferences concerning the nature and extent of change over time and the factors influencing change are generally, obtained from five design strategies (Kessles & Berg 1982): simultaneous cross sectional studies, trend studies, cohort studies, panel studies and time series studies. They differ mainly in how the sample to be studied at different points in time is constituted.

(i) Simultaneous cross-sectional studies

Longitudinal studies involve collecting data from a sample at different points in time in order to study changes or continuity in the samples' characteristics. In simultaneous cross-sectional studies, two or more related cross-sectional studies are conducted at the same point in time with different age groups being sampled by each cross-sectional study. The same predictor and criterion variables are observed for each age sample. Moreover the age samples are each drawn from the same larger population. However, each sample is drawn independently of the other.

(ii) Trend studies

Trend studies describe change by selecting a different sample at each data collection point from a population that does not remain constant. In trend studies, a

given general population that does not remain constant is sampled at each data collection point. The same individuals are not surveyed but each sample represents the same population.

Example 10.2

If an investigator wanted to study trends in the use of pocket calculators, in the teaching of high school mathematics, he/she would select a sample each year from the current membership directory of a Mathematics Teachers' Association. Each year he would send questionnaires to the sample selected and would compare responses from year to year.

Although the population of mathematics teachers would change from year to year and different mathematics teachers would be surveyed each year, if appropriate sampling procedures such as random sampling were used, the responses could be regarded as representative of the population of mathematics teachers from which the sample were drawn. The investigator would then compare responses from year to year to determine what trends were present. The aim is generally to study the trend to find out whether there is a positive or negative change over time.

(iii) Cohort studies

In Cohort studies, a specific population such as members of the 1978 graduating class at Makerere University is sampled throughout the course of the survey.

Cohort studies, therefore, describe change by selecting a different sample at each data collection point from a population that remains constant.

Example 10.3

Suppose we wish to study the yearly work status of all secondary school teachers who received a Makerere University degree in 1978, we would list the names of all members of this teaching population and each data collection point we would randomly select a sample from this list. Thus, the population would remain the

same but different individuals would be sampled each year. In contrast, in a trend study, the population is likely to change at each data collection.

(iv) Panel studies

In panel studies, the investigator selects a sample at the outset of the study and then at each subsequent data collection point, surveys the same individuals (Gay and Atkinson, 1996). Since panel studies follow the same individuals over time, the researcher can note changes in specific individuals and can therefore, explore possible reasons why these individuals have changed. Such individual changes cannot be explored in trend or cohort studies since different individuals make up the sample at each data collection point.

However, loss of subjects is a serious problem in panel studies, especially If the study extends over a long period of time.

Example 10.4

1n a large-scale panel study that follows students who graduated from university in 1990, a response rate of 80% may be obtained in the first ‘ear of study, in the second year a response rate of 55% may be obtained I perhaps 20% in the fifth year.

Not only does the number of subjects become smaller, but also the lining subjects may be a biased sample because those who dropout likely to be different from those who continue to cooperate in the study.

Despite the problems of attention and repeated measurement, longitudinal research using a panel design has advantages over trend and cohort research. Because the same individuals are measured at each data collection point, the panel design is sensitive to smaller changes than sized samples m cohort or trend studies. Panel studies also have the advantage of identifying who is changing and in what way. Thus the researcher can trace back to the events and characteristics of the individuals that might have contributed to the change.

Advantages and disadvantages of longitudinal studies

Advantages

Longitudinal studies have the advantage of allowing the researcher to measure the pattern of change and obtain factual information requiring collection on a regular or continuing basis.

Longitudinal studies are repeated over an expanded period. The advantage is that they can track change over time. It can ably question about the past attitudes, history and future expectations which however, need careful interpretation of the responses to these kinds of questions.

Disadvantages

Longitudinal studies can suffer from the conditioning effect. This describes a situation where if the same respondents are contacted frequently, they begin to know what is expected of them. Consequently, they may respond to questions without thought or they may lose interest in the inquiry with the same result.

Longitudinal research, important though, has the constraints of budget and time, which imposes the need for cross-sectional analysis.

(v) Tune series designs

The design of time series studies requires that data be collected from two groups the experimental and control groups. The data is collected several times prior to the treatment and after the application of the treatment. The many observation5 of the outcome variable taken before and after the treatment provide more reliable picture of growth and trends in performance in the two groups.

Advantages and Disadvantages of time series studies

Advantages

Von Eye (1985) has drawn attention to five advantages, which this type of design has over the simultaneous cross-sectional design and the trend design referred to earlier on.

Firstly, it is possible to identify intra-individual constancy or change directly, thereby reducing the confounding effects that arises from changing environmental circumstances, since repeated observations are made on the same subjects.

Von Eye (1985) states that evidence supporting this advantage has been found repeatedly in the differences in the growth curves obtained from time series longitudinal designs compared ‘with those obtained from simultaneous cross-sectional designs.

Secondly, by observing more than one individual or group of individuals, differences between indhidua1s or groups in the intra-individual sequences of development become clear. This enables homogeneity or variability in development to be examined between individuals or groups.

Thirdly, since each group of individuals possesses characteristics that are used to identify individuals as members of the group, the time series design permits the constancy or change in the dimensions characterizing membership of a class to be examined through investigation of relationships associated with such characteristics both within classes as well as between classes.

Furthermore, time series design involve the identification of time related influences on development since this design does not include the examination of the effects f the effects of time specific interventions on development, only those 1tifluences that occur naturally over time are involved.

The fourth advantage is associated with the study of linkages between such influences and intra-individual or intra-group constancy or change in particular characteristics.
The fifth advantage is concerned with the investigation of relationship between time-based influences on inter-individual and inter-group constancy or change in SPec1fC characteristics.

Disadvantages
Firstly, the conduct of time series studies is expensive since it is commonly very costly to maintain contact with a significant number of sample members over an extended Period of time.
Secondly, sample losses can give rise to substantial distortions of observed relationships.

Thirdly, a limited sequence of observations either through starting with an age group at some time after birth or through premature limitations of the observation mean that critical information is not available to reveal either a coherent pattern of development or to identify the effects of factors that influence development.

The costs associated with the conduct of prospective time series studies hive led to many research workers to employ a retrospective time series design in which a sample is selected and the members of the sample are invited to recall events in their lives at particular times or when they were at specific ages.

Retrospective studies suffer from major shortcomings. First, the sample Selected is necessarily biased, because only those who have survived are available for interrogation. Moreover, the losses through death, migration and residential mobility might distort in significant ways the relationships that are derived from the data.

Secondly, the recall by subject of events that took place at either stages their lives can also be distorted either deliberately or unintentionally because in changing circumstances, individuals prefer to present a favourable view of their past lives.

It is to be noted also that whereas longitudinal research involves the study of a sample on a more than one occasion, time series study involves a quasi-experimental design with one group, which is repeatedly pre-tested, exposed to an experimental treatment and repeatedly post-tested Gay (1996).

5.3 Correlation designs

Correlation research is sometimes treated as a type of descriptive research, primarily because it does describe an existing condition. However, the condition is described is distinctly different from conditions typically described in self-report or observational studies. A correlation study describes in quantitative terms and degree to which variable are related.

Correlation method involves collecting data in order to determine whether and to what degree a relationship exists between two or more variables. The degree of relationship is expressed as a correlation coefficient. Correlation studies provide an estimate of just how related two variables are. The more related two variables are, the more accurate the predictions based on their relationship.

Types of correlation studies

The following are the types of correlation methods.

(i) Simple correlation studies. This determines the degree of relationship between two variables.

(ii) Multiple correlation. This determines the degree of relationship between three or more variables simultaneously. For example, the relationship between delinquencies, home background and level of academic achievement, intelligence and personality.

(iii) Partial correlation. This aims at establishing the degree of relationship between two variables after the influence of the third has been controlled or partialled out.

5.4 Experimental research methods

Experimental research provides a systematic and logical method for answering the question, "If this is done under carefully controlled conditions, what will happen". Experimenters deliberately and systematically manipulate certain stimuli, treatments or environmental conditions and observe how the conditions or behaviour of the subject is affected or changed.

They are also aware of other factors that could influence the outcome and carefully remove or control them. Experimental designs vary in complexity and adequacy depending on such a factors as the nature of the problem under investigation, the nature of data, the facilities for carrying out the study, and especially, the research sophistication and competence of the investigator.

In an experimental study, there are usually two groups, namely:

(i) Experimental group which is exposed to the treatment; and

(ii) The control group, which is not exposed to the treatment or is exposed to another treatment.

At the end, measures of the intervention are then compared between the experimental and control groups. If other variables are controlled, and if the experimental group performs better than the control group, the intervention is said to be effective.

Experimental studies are designed to derive verifiable relationships among phenomena under controlled conditions.

- Their purpose is to verify the effect of the independent variable on the dependent variable

- A treatment or social intervention may be given to a group and the second group kept as control to investigate the effects of the treatment
- Experimental study involves the manipulation of conditions by the experimenter (researcher) to determine cause-and-effect relationships
- In experimental designs, maximum variations in the dependent and independent variables are incorporated in the design
- Experimental designs are especially useful in addressing evaluation questions about the effectiveness and the impact of programs.

(i) Quasi-experimental designs

These are designs, which lack very high rigour in the control of the experimental setting. They are of two types:

(a) Non equivalent group, post-test only designs

This design consists of administering an outcome measure to two groups (treatment and control group) and comparing the outcome measure in the two groups.

(b) Non equivalent group pre-test-post-test

In this design, the researcher assigns the subjects to two groups. To establish if the two groups are initially different on the outcome measure, the two groups are pre-tested on the outcome measure. The treatment is then given to one of the groups (experimental group) and not to the other group (the control group). At the end of the treatment a post-test is given to the two groups. This design may have the problem of lack of equality in the dependent variable at the beginning of the experiment and also the inability of the researcher to control for extraneous variables.

(ii) True Experimental designs

In true experiment the equivalence of the experimental and control groups in provided by random assignment of subjects to experimental and control treatments. A true experimental design has three major characteristics:

a) First, subjects for the study are randomly selected
b) Second, subjects must be randomly assigned to experimental and control groups and
c) Third, both the dependent and independent variables must be measurable.

The first characteristic refers to the fact that each element of the population has an equal chance of being selected into the sample, made up of the experimental and control groups. The second point refers to the fact the choice of who should belong to the experimental or control group is also random. The independent variable is usually measurable since its attributes are belonging to one of the groups. The dependent variable must not only be measurable but both valid and reliable.
Three things should be noted about the random assignment of subjects to groups in true experimental designs.

(a) It takes place before the experiment begins.
(b) Second, the use of random assignment allows the researcher to form groups that, right at the beginning of the study, are equivalent that is, they differ only by chance in any variables of interest.
(c) The use of intact groups should be discouraged unless these have been established to be equal

Types of true experimental designs

A selected true experimental design dictates to a great extent, the specific procedures of study. There are many designs options available when conducting a true experiment. The following list of designs was organized by Campbell and Stanley (1963).

(a) Single group design

The single group experimental also known as one-group method is the most elementary and least rigorous design. It consists of comparing the growth of a single group under two different conditions i.e. of subjecting the group successively to an experimental and to a control action for equivalent periods of time and then comparing the outcomes.

The procedure might be listed as follows:

- Test the group; introduce method A; test the group again; and note the changes or gains.
- Allow for a period of transition
- Test the group once again, introduce method B: test the group once more; note the changes or gains
- Compare the gains in 1 and 3

Example 10.5

Suppose that a researcher wishes to verify the effectiveness of a teaching method A in comparison to method B. The performance of students would be measured before the introduction of method A in comparison to method B. The performance of students would be measured before the introduction of method A. The same group of students would be taught by method A and their performance measured after. The gain in performance would then be established. To the same group of students, the exercise is repeated for method B and the two gains compared

Advantages

On the favourable side, it is possible tor the experiment to be conducted by the researcher alone. Moreover since the same group and the same researcher are in involved, both researcher and subject characteristics are equated.

This design may be found satisfactory when the independent variable produces a relatively drastic effect, making the influence of non experimental factors practically negligible, and also where the experiment is of brief duration, thus minimizing the action of irrelevant factors.

Disadvantages

This method does not necessarily establish experimental control. It may fail to control many non-experimental variables, and it is difficult to ascertain whether the difference between the pre-test and post-test scores results from the influence of the independent variable or from other variable.

The one group method of experimentation is relatively inadequate except for purposes of crude examination and unless it is handled with care, the experimenter may easily give credit to the independent variable for causing changes and overlook other conditions that actually account for the results obtained.

(b) The parallel group design

This is also known as equivalent group method. It is designed to overcome certain difficulties encountered in the one group design. Here, the relative effects of two treatments are compared on the basis of two groups, which are equated in all relevant aspects.

The second group which is called the control group, serves as a reference from which comparisons are made. In educational experiments, the groups being compared generally are equated on age, I.Q, motivation, sex etc. After equating the groups, the investigation introduces an independent variable (the intervention or treatment) to the experimental group and allows the control group to carry on in the customary manner.

After a reasonable interval of time of the intervention the outcome measure between the two groups are compared to determine the effect of the independent variable. The basic design of parallel group experimentation might be represented as follows:

Experimental	**Control**
Pre-test	Pre-test
Experimental factor	Control factor
Post-test	Post-test
Comparison of gains	

Advantages

- Where equivalence of the groups has been established, such a design can generally provide reasonable and dependable conclusions
- By comparing the mean change scores or the mean gain in scores obtained by the two groups - the investigator can determine whether the application of the independent variable caused a significant change in the experimental groups scores as compared to the control groups scores.

Disadvantages

Finding matched pairs often proves to be an extremely difficult process. One has to measure the relevant factors for a large number of subjects before finding a sufficient number of qualified pairs. Much time and effort is employed in testing subjects who quite often cannot he used in the study.

Deciding which of the relevant variables should be given consideration in pairing often presents another problem. The possibility of subjects dropping Out of the experiment is ever present and the loss of any cases may impair the matching design.

(c) The pre-test post-test only control group design with random assignment

This design requires the random selection of subjects from the population and random assignment into two groups. Subjects in both groups are tested before and after treatment however, subjects in only one group are exposed to independent variable.

Example 10.6

A researcher may be interested in the effects of daily exercise on patients with high blood pressure. Blood pressure readings for both groups of patients are recorded, and then the researcher instructs the subjects in one group to follow a carefully planned exercise regime. The others are to continue their normal routines; later, the researcher measures blood pressure for subjects in both groups. If it is lower for subjects in the experimental group, then the exercise programme had an effect.

Advantages

The combination of random assignment and the presence of a pre-test and control group serve to control for all sources of internal validity. Random assignments controls for regression and selection factors; the pre-test caters for mortality, randomization and the control group control for maturation, history, testing and instrumentation.

Disadvantages

Among its weaknesses is the fact that it doesn't control for testing. A pre-test can sensitize subjects to the nature of intervention. Also if gain scores from pre-test to post-test are used as the dependent variable, regression may be an additional threat to internal validity. A subject who performs poorly on pre-test is likely to do better on the post test by regression alone. Conversely a subject who performs well on the pretest may do relatively worse on the post-test by regression alone.

(d) The post-test only control group design with random assignment.

When very large sample is available, two randomly selected groups can be assumed to be equivalent consequently, subjects do not take a pretest to establish equivalence. Subjects in the experimental group are exposed to the independent variable while subjects in the control follow their normal routine, subjects are tested in both groups. Steps involved in the post-test only control group design are as follows:

- Randomly assign subjects to the experimental and control growth.
- Administer the treatment to the experimental group but not to the control group.
- Administer the post-test of the outcome measure to both groups.

Example 10.7

Consider a study in which the researcher investigates the effects of a series of sensitivity training workshops on faculty morale in a large high school district. The researcher then (1) randomly selects a sample of 100 teachers in the district and

divides them into to two groups, (2) exposes one group, but not the other, to the training, and then (3) measures the morale of each group using a questionnaire.

Advantages

There is control of threats to internal validity including testing and regression.

Weaknesses

Inability to detect differences in subjects levels of functioning before implementation of the independent variables. Post test only group design is recommended when it is not possible to locate pre-test or when there is a possibility that the pre- test has an effect on the experimental treatment.

(e) The rotatory-group design

Here, both the experimental and control groups are rotated. It is assumed that these two groups have been equated on the extraneous variables. The rotation is carried out at specific time intervals (Campbell and Stanley 1963).

(f) The randomized Solomon four group design

The Solomon four group design is a special case of a factorial design. It is used to achieve three purposes.

- To assess the effect of the experimental treatment relative to the control group.
- To assess the effects of a pre-test and
- To assess the interaction between pre-test and treatment to

In this design, subjects are randomly assigned to four groups. Two groups receive experimental treatment. One experimental group receives a pretest. Two groups (control) do not receive treatment. One control group receives a pre-test. All four groups received post-tests (Campbell and Stanley 1963).

The Solomon for group design is an attempt to eliminate the possible effects "a pre-test. It involves random assignment of subjects to four groups with two of the

groups being pre-tested and two not. One of the pre-tested groups and one of the unpre-tested groups is exposed to the experimental treatment.
All four groups are post-tested.

Advantage

It provides the best control of the threats to internal validity.

Weaknesses

It requires a large sample in that subjects must be assigned to four groups Furthermore, conducting a study involving four groups at the same time requires considerable amount of time, energy and effort on the part of the researcher; but it makes up for these drawback, through its elegance and power.

(g) Factorial design with random assignments

It is a design that studies a combination of two or more factors on the dependent variable at a time. They extend the number of relationship that ma he examined in experimental study.
As in all true experimental designs, subjects in factorial designs must be randomly sampled from the population. Equally important they must be randomly assigned to conditions. Random assignment ensures that differences between groups are limited to the independent variable and are not characteristics associated with the sample.

A major reason for using a factorial design is that the researcher is interested in interactions, that is the combined effects of the variables in the study.

		Treatment (B)	
Gender (A)	Male		
	Female		

Fig 10.1 An illustration of a factorial design

Is treatment better for men or women or is it equally effective regardless of gender? Although factorial designs offer the opportunity to assess the effects of separate variables and any interactions, they do require the researcher to include more groups thereby, increasing the cost of the study.

General advantages of true experimental designs

The overall advantage in randomly selecting subjects and randomly assigning subjects is the reduction of threats to internal validity that are often present when "intact" groups are used. This feature allows for confidence when making claims of cause- effect relationships between independent and dependent variables. It also provides a strong basis for making references about the characteristics of a population.

Limitations

The requirement of random selection from the population and a random assignment into groups excludes them from use of a vast number of important research questions e.g. for ethical reasons individuals with health problems cannot be randomly assigned to a control group with treatment that is resumed to be inferior to the experimental procedure. Some populations are sufficiently dispersed and small that obtaining a random sample of any size would be impractical.

With complex educational programs rarely can researchers control all the important variables, which are likely to influence program outcomes, even with the best experimental design.

Finally, even when the purpose of the evaluation, is to assess the impact of program, logistical and feasibility issues constrain true experimental frameworks.

Controlling extraneous variables in experiments

Extraneous variables are those uncontrolled variables (i.e. variables not manipulated by the experimenter,) that may have a significant influence upon the results of a study.

Variables that are not of direct interest to the researcher may be removed or their influence minimized by several methods, which are discussed in the following ways.

Randomization

Randomization is the best way to attempt to control for many extraneous variables all at the same time. The logical implication of the above statements is that randomization should be used whenever possible; subjects should be randomly selected from a population Subjects should be randomly assigned to groups, treatment should be randomly assigned to groups. Randomization is effective in creating equivalent, representative groups that are essentially the same on all relevant variables thought of by the researcher, and probably even a few not thought of (Campbell and Stanley 1963).

The rationale is that if subject are assigned at random to groups, there is no reason to believe that the groups are different in any systematic way. Thus the groups would be expected to perform essentially the same on dependent variable. Therefore if the groups perform differently at the end of the study, the difference can e attributed to the treatment or independent variable. Randomization provides the most effective method of limiting systematic bias and of minimizing the effect of extraneous variables. The principle is based upon the assumption that through random assignment, differences between groups result only from the operation of probability or chance. These differences are known as sampling error.

2. Hold certain variables constant

In addition to randomization, there are other ways to control for extraneous variables. Holding them constant for all groups, for example can control certain environmental variables. The idea here is to eliminate the possible effects of a variable by removing it from the study. For example, if a researcher suspects that gender might influence the outcomes of the study, control could be done by restricting the subjects of the study to females and by excluding all males. The variable of gender in other words has been held constant there is a cost involved

(as there almost always is) for thus control, however as the generalizability of the results of the study are correspondingly reduced.

3. Matching

Matching is a technique for equating groups on one or more variable the researcher has identified as being highly related to performance on the dependent variable. When randomisation is not feasible (e.g. there are two few subjects) selecting pairs or sets of individuals with identical or nearly identical characteristics and assigning one of them to the experimental group and the other to the control group provides another method of control. The most commonly used approach to matching involves random assignment of pairs of members, one member to each group. As the researcher identifies each matched pair, one member o the pair is randomly assigned to one group and other member to the other group. If the subject does not have a suitable match, the subject is excluded from the study (Campbell and Stanley 1963).

The resulting matched groups are identical or very similar with respect to the identified extraneous variable. This method is limited by the difficult of matching on more than on variable. It is also likely that some individuals will be excluded from the experiment if a matching subject is not available.

4. Balancing cases or group matching

Balancing cases consists of assigning subjects to experimental and control groups in such away that the means and the variance of the groups are nearly equal as possible. Because identical balancing of groups is impossible, the researcher must decide how much departure from equality can be tolerated without loss of satisfactory control. This method presents a similar difficulty noted in the matching method, namely the difficulty of equating groups on the basis of more than one characteristic or variable.

5. Using subjects as their own controls

Using subjects as their own controls involves exposing the same group to different treatments or treatment at a time. This helps to control for subjects differences. Thus the same students might be taught algebra units both by inquiry and a lecture method. This approach is not always feasible; one cannot teach the same algebraic concepts twice to the same group using two different methods of instruction. A problem with this approach in some studies is carry over effects of the treatment to the next.

6. Comparing homogeneous groups

Another way of controlling extraneous variable is to compare groups that are homogenous with respect to that variable. For example if IQ were an identified extraneous variable the researcher might select a group of objects with IQs between 85 and 115 (average IQ), the researcher would then randomly assign half of the subjects to the experimental group and half to the control group.

7. Analysis of covariance

This method (see chapter five) permits the experimenter to eliminate initial differences on several variables between the experimental and control groups by statistical method. The analysis of covariance is a statistical method for equating randomly formed groups on one or more variables. In essence, analysis of covariance adjusts scores on a dependent variable for initial differences on some other variable, such as pre-test. Although analysis of covariance can be used in studies when groups cannot be randomly formed, its use is most appropriate when randomization is used. Despite randomization, for example, it might be found that two groups still differ significantly in terms of pre-test scores. Analysis of covariance can be used in such cases to 'correct' or adjust post-test scores for initial pre-test differences (Amin, 2004).

5.4 Causal designs

What is Causal Comparative Research?

The major aim of research is to describe phenomena or to explore relationships between different phenomena. In causal designs the cause- and-effect relationship is of an utmost interest to the researcher. For instance, if a researcher finds that a certain method of teaching improves students' ability to solve problems, that knowledge can be utilized to develop a theory of problem solving method.

Causal research is concerned with the researcher attempting to establish the cause or reason for the existence of differences in the behaviour or status of groups of individuals. It also seeks to identify associations among variables.

Example 10.8

A researcher might observe, for example that two groups of individuals differ on some variable (such as the teaching method) and then attempt to establish the reasons for or the effects of this variance. The difference between the groups, however, has already occurred. Hence, the cause- and-effect which have already occurred are studied in retrospect.

Unlike the experimental research, the independent variable or "cause" is not manipulated. It has already occurred. Independent variable in causal comparative studies are variables which cannot be manipulated (e.g. sex, male - female). Cause-effect relationships established are tentative and confirmed only after several instances of an established cause-and- effect relationship.

Merits and demerits of causal comparative research

Merits

It facilitates the study of many cause-and-effect relationships in the social sciences which are not amenable to experimental manipulation. Independent variables in causal-comparative studies cannot be manipulated. For instance, it is not possible to manipulate organismic variables such as sex.

Casual comparative studies also identify relationships that may lead to experimental studies, In some cases, causal-comparative are conducted solely for

the purpose of determining the probable outcome of an experimental study (Creswell, 2003).

Hence, Causal comparative studies permit investigation of variables that cannot or should not be investigated experimentally, facilitate decision making, provide guidance for experimental studies and are cheap to conduct.

Demerits

Determining causal patterns with any degree of certainty is difficult in casual comparative research design. An observed relationship between variables X and Y can mean that X causes Y, and Y causes X or a third variable P causes both X and Y.

Another limitation of the causal comparative research is that the same kinds of control cannot be exercised as in an experimental study since the independent variable has already occurred. Much care must be applied in interpreting results. An apparent Cause-effect relationship may not be as it appears. The relation established is not necessarily a causal one. For instance, suppose a researcher hypothesized that 'confidence' is determinant of 'achievement'. The researcher will identify two groups of pupils one group A, with high 'confidence' and another group B with low 'confidence' and then compare their achievement. If group A shows higher 'achievement', the temptation would be to conclude that high confidence causes achievement. This conclusion would not be warranted since it would not be possible to establish that confidence precedes achievement and that achievement is caused by confidence.

Types of causal comparative research

Types 1: effects (Dependent variable) caused by membership in a group
Question: What differences in abilities are caused by gender?
Hypothesis: Males have greater amount of mathematical ability than females.
Type 2: Causes: (Independent variable) of group membership.
Question: What causes individuals to join the army?

Hypothesis: Soldiers have more aggressive personalities than civilians.

Type 3: Consequences (dependent variable) of an intervention

Question: How do students taught by discussion method react to propaganda?

Hypothesis: Students who are taught by the discussion method are more critical of propaganda than those who are taught by the lecture method.

Planning a causal comparative design

Problem Formulation

The initial step in formulating a problem in causal-comparative research is usually to identify and define the particular phenomena of interest and then consider possible causes or consequences. For instance, a researcher is interested in students' ability to innovate. What causes innovation? Why are a few students highly innovative while most are not?

The research speculates, for instance, that high-level innovation might be caused by a combination of social failure and scientific achievement. He/she also identifies a number of alternate hypothesis that may explain the difference been highly innovative and non-innovative students.

Once the researcher has identified the possible cause of the problem, he/ she makes a statement of a research problem to be investigated. For instance, the objective of this study is "to examine possible differences between students of high and low innovation".

Thus, the testing of several alternate hypotheses is a basic requirement of a good causal comparative research and whenever possible, a basis for identifying variables on which comparison group are to be contrasted.

5.5 Sample

Once, the researcher, has selected a group having the characteristic he/ she wishes to study, the next step is to select a group not having this characteristic, or define

carefully the characteristic to be studied before selecting groups that differ in this characteristic.

For instance a highly creative student might be defined as one who "has produced an award-winning piece of art". Causal comparative studies depend largely on how carefully the comparison groups are defined. Once defined groups have been identified, they can be matched on one or more variables. This process controls certain variables, thereby eliminating group differences on these variables and minimizing competiting explanations.

Instrumentation

Causal comparative research permits the use of many types of instruments:. These include questionnaire, interviews, achievement tests, observation tools and standardized tests: By using multiple measures the researcher is able to assess the relationship, for instance, between "creativity" (the presumed cause) and several learning outcomes (presumed effects).

Design

The major causal comparative design requires selecting two or more groups that differ on a particular variable of interest and comparing them on another variable or variables. Manipulation is not done. One group posses a characteristic that the other does not.

Control procedures

Lack of randomization, manipulation and control are major threats to internal validity in a causal comparative research. Random assignment of subjects to groups is not possible since the groups have already been formed. Manipulation of the independent variable is not possible since the groups have already been formed. Manipulation of the independent variable is not possible because the group have already been exposed to treatment.

To reduce the chance of subject characteristics threat in a causal comparative study, the following control measures are employed;

1. Matching of subjects

This demands pairing of subjects, one from each group which are similar on that variable. If a match cannot be found for a specific subject, he/she is eliminated. However, this reduces the size of the Sample.

2. Finding or creating homogeneous sub-groups

Another method of controlling extraneous variables in a causal comparative study is either to find or restrict one's comparison to groups that are homogenous on that variable. For example, in matching pupils in group A, one could either seek to find two similar groups in A or form sub groups that represent various levels of the extraneous variable (divided the groups in high, middle, low group A-sub groups) and then compare, the comparable sub groups.

Review Questions

1. What are the distinguishing characteristics between qualitative and quantitative research designs?.
2. Categorize quantitative research designs.
3. Longitudinal designs are of different types, analyze them showing their strengths and weaknesses.
4. Use suitably chosen examples to discuss different types of correlation studies.
5. What are the purposes of experiments in research?
6. Analyze the different types of quasi-experimental research designs.
7. Analyze the different types of true experimental research designs.
8. How would you control for extraneous variables in experimental research?
9. Causal comparative studies are similar to experimental studies. Analyze their similarities and differences.

Unit 6
Sampling Methodology

6.1 Introduction

Population and sample

A population is the complete collection (or universe) of all the elements (units) that are of interest in a particular investigation.

A population is the aggregate or totality of objects or individuals, having one or more characteristics in common that are of interest to the researcher and where inferences are to be made.

A population need not necessarily have the demographic meaning that consists or people. It may be a complete collection of all the objects or people, students, cars, animals, heads of households, plants, books, schools, farms companies etc, in a particular investigation.

A sample, on the other hand is a collection of some (a subset) elements of a population.

The ultimate aim in most statistical investigations is to be able to generalize the results of the data from the sample to the entire population from which the sample data was drawn. For this generalization to be valid, the characteristics of the population must be represented in the sample. When the sample data does not represent the population, the validity of the genera1isation of the results from the sample or the population is in doubts. But, what are the types of populations from which data can be collected?

Target and sampled populations

The target population is the population to which the researcher ultimately wants to generalize the results. This target, sometimes called the parent population may not be accessible to the researcher. A sampled or accessible population on the other hand is the population from which the sample is actually drawn. In actual fact,

sample results should in fact be generalized only to the sampled population. The extension of this generalization to the target population will depend on the similarity between he two types of populations.

Example 11.1

Suppose that an opinion poll is to be carried out the week before the elections in this country to determine the ratings of the different parties. Here the target population is all the registered voters in the country. Within the limited time and financial resources available it will not be possible to draw samples from all the constituencies across the country.

The investigator may then choose to draw the sample from a few cosmopolitan constituencies with diverse electorates.

The sampled population will then comprise all the registered voters in the selected constituencies. The reliability of the results of such an opinion p011 will evidently depend on the similarity between the selected constituencies and the nation as whole.

The diagram below depicts the relationship among sample, sampled population and target population.

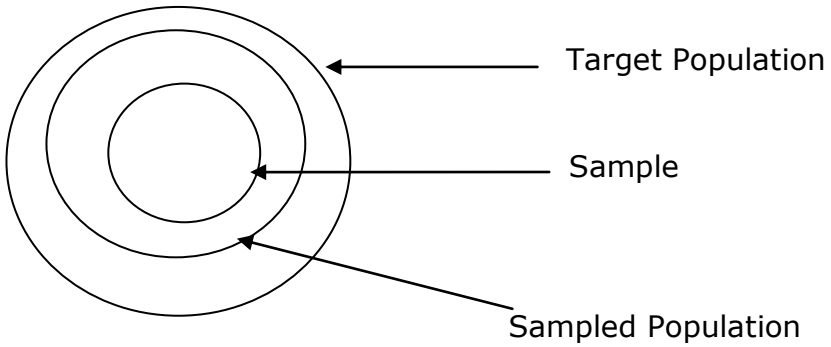


Figure 11.1: Relationship amongst sample, sampled and target populations

Ideally, the sampled and target populations should not be very different for generalizations to go from the sample to the target population.

6.2 Sampling

Sampling is the process of selecting elements from a population in such a way that the sample elements selected represent the population.

A sample is a portion of the population whose results can be generalized to the entire population. Sampling therefore, is a process of extracting a portion of the population from which generalization to the population can be made.

In research, the sample should be a representation of the population. This means that as much as possible, most characteristics of the population should be represented in the sample selected. Characteristics may include gender, level of education, economic background, religious affiliation and many others dictated upon by the nature of the study.

Sampling and sampling processes

The conception of sampling and its importance to research has been seen in a number of ways.

- A sample is a small portion of a population selected for observation and analysis. By observing the characteristics of the sample, one can make certain inferences about the characteristics of the population from which it is drawn.
- Every research study involves to one degree or another, a sampling process. Sampling is involved when any choice is made about studying some people, object, situations or events rather than others rather than all.
- Sampling enables the researcher to study a relatively small number of units in place of the target population, and to obtain data that are representative of the target population.

- The researchers opt for an incomplete coverage and study only a small proportion of the population, a sample. Sampling is thus the process of choosing the units of the target population which are to be included in the study.
- Sampling is the process by which a relatively small number of individuals or measures of individuals, objects, or event is selected and analyzed in order to find out something about the entire population from which it was selected.

- To obtain a representative sample, the researcher should consider the characteristics of the target population when sampling is done

Five steps are involved in the process:

- Defining the population;
- Listing the elements of the population, called the sample frame;
- Determine an appropriate sampling methodology;
- Deciding on an adequate sample size;
- Selecting a representative sample.

Example 11.2

In a study relating the impact of education levels on attitude to marriage, in Kampala, the researcher will have to:

- Define the generalisable population which, in this case, is people living in Kampala.
- Identify the group to be sampled and determine the population size. This should be both be men and women since the study does not specify on sex.
- After studying the nature of the population determine the sampling method to use (stratification by sex, age, social status, location etc).
- Determine the sample sizes by stratum (if stratification is required)
- Select the sample.

6.3 Advantages and disadvantages of sampling

Advantages

Selecting a sample is a very important step in conducting a research study, particularly for quantitative research. The researcher must determine the size of the sample that will provide sufficient data to answer the research problem. Regardless of what sampling approach is used, all sampling approaches aim at serving the purpose of generalizability of findings and reduction of costs and time.

If the population under study is homogeneous, a small sample is sufficient. On the other hand, a much larger sample is necessary if there is a greater variability (heterogeneity) in the units of the population. But increasing the size of the sample is of little value if units are not chosen in the way that ensures representativeness of the sample.

A small sample is often satisfactory in an intensive laboratory experiment in which greater precision is desired and in which subjects take up many measures.

There are many reasons why sampling is important:

- Reduced costs: If the data are collected for the entire population, cost may be very high. It becomes economical if the data are collected from a sample.
- Greater speed: The use of sampling economizes on time. Sampling is less time consuming than the census. Tabulation and analysis of results take much less time in sample data than in population data. For example, the compilation of a population census usually takes several years and a lot of money to complete, whereas very reliable information may still be obtained at much reduced costs and time, through a carefully planned survey involving only a small proportion of the population.
- Greater accuracy: Sampling ensures completeness and a high degree of accuracy due to a limited ‘area of operation. In dealing with a sample, the volume of work is reduced; therefore careful execution of fieldwork is

possible. The processing of the data is also done more accurately, which may in turn produce accurate results. By concentrating on fewer elements in the population, more comprehensive data may be obtained. That is, from the sample, more thorough investigation, not possible with large populations, can be conducted.

Disadvantages

The main disadvantage of sampling is that the selected units may not be representative of the population, even when the best statistical methods have been applied. This is especially the case when the sample size is small.

Also even if a sample is representative of the accessible or sampled population, it is often not 100% representative of the target population, since elements that are not accessible will usually be different from those that are accessible.

In investigations where sampling will lead to the destruction of the sampled unit, there is no alternative than to sample. For example, since a bulb is destroyed during testing to determine its life, only a sample of bulbs can be used to estimate the expected life span of bulbs from a given production line.

Similarly, the blood taken from a patient to determine the number of malaria parasites in his/her body cannot be injected back after the blood test. Hence the doctor can only take a blood sample of the patient, and use the number of parasites in that sample to estimate the seriousness of the malaria attack in his/her blood system.

Characteristics of a good sample

A good sample is one that is representative of the population from which it was selected. Regardless of what sampling approach is used, the researcher should describe its characteristics and relate these to the population. This description should include the number of participants in the sample and a description of

demographics of the sample. For instance, average age, gender composition, level of education, and other relevant variables.

A good sample should possess the I'ii1owing characteristics:

- A good sample is one that, within the restrictions imposed by its size, will reproduce the characteristics of the population with t greatest possible accuracy,
- It should be free from error due to bias or due to deliberate selection of the units of the sample
- It should be free from random sampling error. It should not be selected by a procedure where there is a connection between the method of selection and the characteristics under consideration.
- There should not be any substitution of originally selected unit by some other more convenient way, if any.
- It should not suffer from incomplete coverage of the units selected for the study.
- Relatively small samples properly selected may be much more reliable than large samples poorly selected. But, at the same time it is very essential that the sample is adequate in size so that it can become reliable.
- While constructing a sample, it is important that measurable or known probability sample techniques are used. This will substantially reduce the likelihood of discrepancies.

6.4 Problems of sampling

Despite many positive attributes, sampling has a number of problems;

- Sampling procedures require more administration, planning and programming than census surveys (Sarantakos 1988).

- The common argument against sampling is that it may involve biased selection, which in turn leads to drawing erroneous inferences. Causes of a biased sample may he a faulty method of selection of individuals/units for the sample or the nature of the phenomenon itself.

- Selection of a truly representative sample is very difficult particularly when the phenomenon under study is complex. Remember, the results of the sample are accurate and useable only when the sample is representative of the entire population.

- Sampling requires a specialised knowledge in sampling techniques, statistical analysis and calculation of probable error. In the absence of such knowledge the researcher may end up committing serious mistakes (Sidhu 1984).

- It will be unscientific to draw a sample from the target population, which is not homogeneous without considering its heterogeneous characteristics.

- In studies where a high degree of accuracy is required, the sampling method may not be appropriate. Even if a sample is drawn with utmost care, there will always be some chances of error.

Non-scientific sampling approaches

Non-scientific sampling approaches are sampling methods, where the elements in the population do not have a known probability of being selected. They are also known as non-probability sampling. In these approaches the elements of the population do not have a well-defined chance of being selected and may not be clearly defined In such cases, the representativeness of the sample is not an issue. For example, if one is studying students' opinion on the recent students' strike at university, there may not be a need for a sample because the issue does not concern gender differences, programmes attended or economic background. The main concern is to find out the cause of the strike. The researcher may simply locate a point on campus and interview any student that shows up. When non-random samples are used, it is usually difficult to describe the population from which the sample was drawn.

Non-probability samples may include volunteers, easily available units, or those that just happen to be present when the research is done.

Non-probability samples are useful for quick and inexpensive studies, for case studies, for qualitative research, for pilot studies, and for developing hypotheses for future research.

Methods that can be used in such circumstances include:

- Convenience sampling
- Purposive sampling
- Quota sampling
- Snowball sampling

(a) Convenience sampling (also accidental and haphazard sampling)

These are also called an 'accidental" samples or "man-in-the-street" samples. The researcher selects units that are convenient, close at hand, easy to reach, etc.

Convenience samples include in the sample, whoever happens to be available at a given moment for a researcher conducting the study. The researcher may, for example, position himself/herself at a particular spot such as the entrance of the supermarket, a street point at any given time, patients attending a clinic on a specific day and collect information from his or her informants. Two examples of convenience sampling are the use of volunteers and the use of existing groups. Those who volunteer to answer are usually different from non-volunteers. Those who answer may be more motivated or more interested in the particular study. Subjects are chosen until the desired sample is obtained. The result of such sampling technique should be generalized to the target population with caution.

(b) Purposive sampling or judgmental sampling

In this type of sampling the researcher uses his/her own judgment or common sense regarding the participant from whom information will be collected.. The researcher usually selects a sample based on his or her experience of knowledge of

the group to be sampled and has in mind that these respondents have the information he/she requires. For example, if a researcher planned to study leadership officials from district to village level, he/she will select local councilor, 5, local councillor 3, local councilor 2 and local councillor 1 because the researcher believes they know what is going on in their districts. In this case the judgment of the researcher in selecting the respondents is more useful than the representativeness of the sample.

On the other hand, if the study seeks to understand the functioning of village organizations, institutions and leadership, it is necessary to supplement discussions with lower level leaders, ordinary men and women who may have important information.

Judgmental sampling is an attempt to include a range of people or a variety of different situations in the study sample. This type of sampling is more appropriate for qualitative research than quantitative research. The main weakness of this sampling is the potential for inaccuracy in the researcher's criteria and the resulting sample selection.

(c) Quota or proportionate sampling

This is often used in survey research when it is not possible to list all members of the population of interest. When quota sampling is involved, those who gather data are given exact characteristics and quotas of persons to be interviewed. For example, 24 police officers with children under the age of 10, 15 working women doctor with no children under the age of 30. This technique of sampling is used in large-scale surveys. When quota sampling is used, data is obtained from easily accessible individuals. Hence, people who are not easy to reach are under-represented.

Example 11.3

A researcher constructs quotas for different types of units to interview a fixed number of shoppers at a mall, half of whom are male and half of whom are female.

Quotas are then attributed to each of these groups. If the relative distribution of these groups is known, a proportionate sample can be chosen to reflect the distribution of the groups in the population.

(d) Snowball sampling

This is also called network sampling. It involves asking a key informant to name other people who should be contacted by the investigator in order to understand some aspects of a situation under study. Snowball is normally used for locating individuals for the study where the researcher begins with few respondents who are difficult or impossible to locate using other means. For example, if the researcher wants to obtain information from street women in a city, he/ she gets in touch with a few of them first who will in return get in touch with their colleagues.

This strategy has advantages of social networks and the fact that friends tend to have characteristics in common. When the researcher has found a few of the individuals with needed criteria, then these individuals are asked for assistance to locate others with similar characteristics. In this way, the sample begins to grow bigger and bigger and this is why it is called a snowball. This process is continued until the topic is saturated that is, until no more substantial information is achieved through additional respondents or until no more respondents are discovered.

Other samples that are usually constructed with non-probability methods include library research, participant observation, marketing research, consulting with experts, and comparing organizations, nations, or governments.

Carefully chosen non-probability samples can be very valuable in certain situations especially when time is short. This is particularly true when the researcher's primary interests is to seek an understanding in qualitative and relational issues rather than quantitative problems pertaining to how much, how often, or what degree a particular attribute or characteristic is distributed.

Non-probability sampling has been found to be effective in obtaining a holistic view of a situation, and in understanding €systems, behaviours, events, institutions, and underlying processes. If used in conjunction with small samples randomly chosen, non-probability sampling can provide valuable insights in explaining information obtained at a more superficial level through questionnaires or semi-structured interview schedules.

Probability sampling

This is a process of selecting a sample in such a way that all elements in the population have some probability of being selected. There are also many types of probability sampling.

(a) Simple random sampling

Simple random sampling (SRS) is one of the most important and fundamental sampling methods in statistics.

A simple random sample is a sample obtained from the population in such a way that samples of the same size have equal chances of being selected.

To understand this definition, let N= Population size and n= sample size. Then the total number of samples of size n that can be selected from the population of size N is given by:

$$C_n^N = \frac{N!}{n!(N-n)!}$$

where N!=N (N-l)(N-2).... 3.2.1 is the factorial of N and n! similarly defined.

Example 11.4

As an illustration, the number of samples of size 2 that can be selected from a population of size 6 is given by:

$$C_2^6 = \frac{6!}{2!(6-1)!} = 15$$

There are thus 15 possible samples of size 2 that can be selected from population of 6 elements.

If the elements of the population arce labelled as A, B, C, D, E, F the 15 possible samples of size 2 (i.e. taking 2 elements at a time) can be constituted as follows: AB, AC, AD, AE, AF, BC, BD, BE, BF, CD, CE, CF, DE, DF, and EF. From the definition above, each of these samples has an equal likelihood of being selected. The practical definition, however, is that if the sample size is n and N is the population size, the probability that an element of the population is included in the sample is:

$\frac{n}{N}$, and $f = \frac{n}{N}$ is often called

the sampling function. Two methods are often used to pick random samples: the lottery method and the random number method.

The lottery method

With the lottery method, the name or number is written on the tag that Identifies elements of the population to be sampled. The tags are placed in a container and well stirred. A tag is then drawn from the container and the process is repeated until the required number of tags is obtained.

The random number method

If there are numbers that identify the elements of the population, the random number method may be used.

The table of random numbers is provided in many elementary statistics books and can also be easily generated by the computer.

As an illustration, suppose there are 98 employees in a firm whose ID numbers are 01, 02, 03...98. We can use the table of random numbers to un a random sample of say 10 employees.

Many of the computers now available on the market have prograz1s that rate random numbers. Therefore as an alternative to the printed random numbers in the tables, the researcher may use a computer to generate the random numbers he/she needs within an interval. Simple random sampling tends to produce representative samples when the population elements are homogeneous with respect to the characteristic of interest.

When the population is heterogeneous (e.g. male and female), simple random sampling can lead to a biased sample. For example, one that consists of only or predominantly males or only or predominantly females. In a heterogeneous population therefore, it is important to take the varied nature of the population characteristics into consideration. There is no technique, not even random sampling guarantees a representative sample, but compared to the other techniques, random sampling is the best way to obtain a representative sample.

Both methods involve defining the population, identifying each individual or member of the population, and selecting individuals basing on the chance basis.

(b) Stratified sampling

This type of sampling methodology takes into consideration the heterogeneous nature of the population to be sampled.

In stratified sampling the population is divided into sub- populations such that the elements within each sub-population are homogeneous. Simple random samples are then selected independently from each subpopulation.

The procedure is to divide the population of size N into k strata with sizes N_1, N_2 ……N_k such that $N = N_1 + N_2 + \ldots\ldots + N_k$

The total sample size n is also partitioned into k strata with size nk from each stratum k such that $n = n_1 + n_2 + \ldots.. + n_k$

In stratified sampling, two situations arise.

a) Stratified sample size is proportionate to stratum size

The sample size from each stratum is proportional to the size of the stratum.

i.e. $\frac{n_1}{N_1} = \frac{n_2}{N_2} = \ldots \frac{n_k}{N_k} = \frac{n}{N} = f$ that is, the sampling fraction f, is constant from stratum to stratum.

Example 11.5

Consider a class that has 200 students, of whom 80 are girls and 120 are boys. If a sample of size 40 is to be drawn from the population of 200 students, proportionate stratified sampling will require that the sampling fraction of $\frac{40}{200} = \frac{1}{5}$ be maintained in both strata (girls and boys). Therefore f the 40 students, that is

$\frac{1}{5}$ of 80=16 would be girls and

$\frac{1}{5}$ of 120=24 would be boys.

b) Stratified sample size is disproportionate to stratum size

In this case, the sample sizes from the different strata are not necessarily proportional to the sizes of the strata. This may arise because of the specific problem of research.

Example 11.6

Reconsider the example above where 40 students are to be selected from 200 students of whom 80 are girls and 120 are boys. If the research question were to investigate the problems girls face in a boarding school setting, it would appear more reasonable to over sample the girls. In this case we include more than 16 girls in the sample, as valid and reliable responses are more likely to be obtained from the girls on the specific problem in question.

If in this case, we may select 20 girls and 2 boys. The sampling fraction will be different for girls and for the boys. In this case, it will be

$\frac{20}{80} = \frac{1}{4}$ for girls

and $\frac{20}{120} = \frac{1}{6}$ for boys.

The sampling fractions differ from one stratum to the next. Sampling is done by selecting a sample in such a way that identified subgroups in the population are represented in the sample in the same proportion that they exist in the population.

For example, if you were going to take a survey to determine who was likely to win in the last elections in this country prior to the elections, you would want your sample to represent the voting population. That should include all the political sensibilities in the country.

The steps in stratified sampling

There are similar to those in random sampling only that the selection is from sub groups in the population rather than the population as a whole.

- Identify and define the population
- Determine the desired sample
- Identify the sub groups for which you want to guarantee representation
- Classify all members of the population as members of one of the identified sub groups.
- Randomly select (using a table of random numbers) the sample

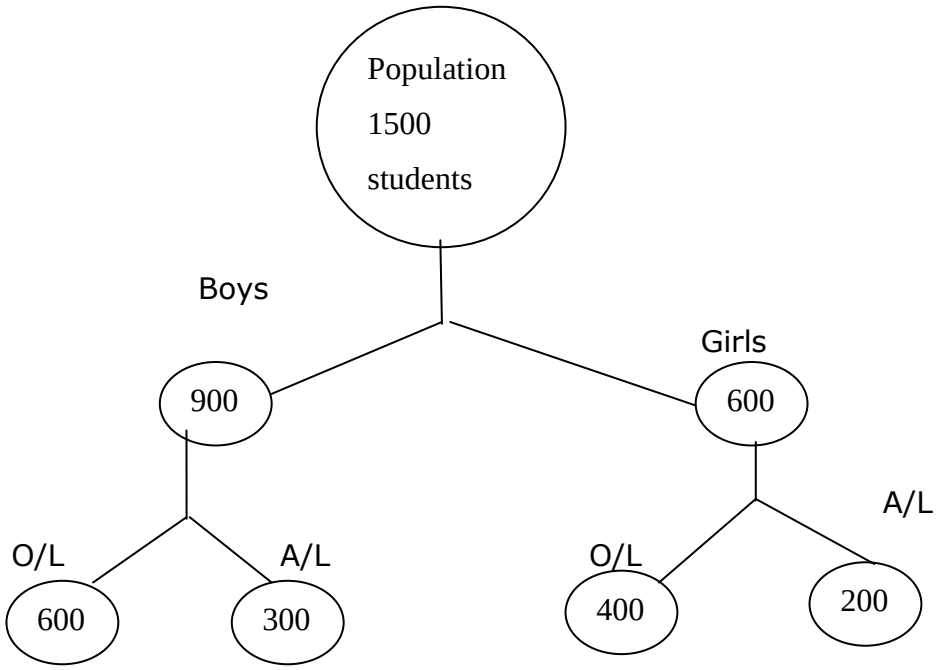


Figure 11.2: An example of stratified sampling

(d) Cluster sampling:

Sometimes, it is convenient to group the elements of a population into subpopulations, each of which can be used as representative, subset of the population. If this is done then the sub-populations are called clusters.

Simple random sampling or other procedure can then be used to select one or more of the clusters. All the elements of the selected clusters then constitute the sample.

Cluster sampling is the sampling methodology in which elements of a population are grouped into clusters and simple random sampling or other type of sampling then performed on the clusters.

Clustering is similar to stratification in that both involve partitioning the population into sub-groups. However, while in stratified sampling the elements within a stratum are relatively homogeneous and cannot be used as a representative subset of the population, in cluster sampling, the elements in each cluster are relatively

heterogeneous and each cluster can be used as a representative subset of the population.

Example 11.7

After an election, an independent investigator decides to estimate the level and type of irregularities made in polling stations in a particular constituency. There were 50 polling stations each with around 500 voters. The investigator wishes to examine a sample of 10,000 voting slip from the 25000 votes cast in the Constituency. If the level and type of irregularities are known/assumed to be very similar in the 50 polling stations, then the cluster sampling could be used to select the sample. In such a case, a random sample of 20 of the 50 polling stations will be selected and all voting slips inspected. Stratified and simple random sampling will both be wasteful in this case since they will require that samples be collected from all 50 polling stations.

Example 11.8

As another example, consider a school district that has 2000 students divided into 50 classrooms, each classroom with 40 students. If one were to use the simple random method to select 200 students, this may involve students from perhaps all the 50 classrooms, and this may pose administrative difficulties and complications. But since there are 50 classrooms (clusters), the researcher may randomly select 5 of these classrooms to obtain the sample of 200 students.

This means that all members of the selected group have similar characteristics and when sampling, groups are selected and not individuals. This method of sampling is always more convenient when the population is large and extensive. It is advantageous because it is not always possible to obtain or compile a list of all members of the population and therefore not possible to use simple random sampling.

Any place (geographical location) within which we find an intact group of similar characteristics IS a cluster. Examples of clusters therefore include: classroom, schools, hospitals, etc.

Steps in cluster sampling

These steps are not different from those involved in random sampling but the difference is random selection of clusters is involved rather than individual units.

- Identify and define the population
- Determine the desired sample size
- Identify and define a logical cluster
- List all clusters that comprise the population
- Estimate the average number of population per cluster
- Randomly select the needed number of clusters (using a table of random numbers).

Cluster sampling can be done in stages, and this involves selection of units within clusters. This process is called multistage sampling. For example, schools can be randomly selected and then classrooms within the selected schools can be randomly selected. The extension can go to the selection of pupils within the selected classrooms.

The advantages of cluster sampling are evident. However, nothing is all- good and therefore cluster sampling has setbacks. Chances are greater of selecting a sample that is not a representative of the population. One way to circumvent this problem is to select a large sample. For example, including more groups thus increasing the likelihood that the groups selected adequately represents the entire population.

(e) Systematic sampling

This type of sampling is easy to use as the random numbers are used only once. Systematic sampling is one in which every kth element of the sampling frame is selected.

To formalize the procedure:

Let N be the population size,

n the sample size,

k the number of intervals (i.e. every k^{th} element is to be selected),

then N=nk

For example, if a population has N = 100 elements and a sample of size n = 20 is to be selected, the size of each interval will be

$\frac{N}{n} = \frac{100}{20}$ = 5, Hence every 5th element of the population will be selected after randomly selecting the first one. This method of selection uses the random number table only once to find the starting point (first data). Moreover, it is not necessary to number the elements in the sampling frame. Thus this is a good procedure for sampling from a large population. 'However, there are dangers inherent in using the systematic sampling technique. When the population is repetitive or cyclical in nature, systematic sampling should not be used. This defect is known as the periodicity of the sample frame.

This is sampling in which individuals are selected from a list by taking every k^{th} name.

This depends on what k is. If k =4, selection involves every name, if k =8, every 8^{th} name. The value of k, depends on the size of the list and the desired sample size. The major difference is that unlike other types of sampling, in systematic sampling, all members of population do not have an independent chance of being selected.

Systematic sampling can be considered random because one of the other has to be random: either the selection process or the list. Depending upon the type of the study, a sample may be used intact or randomly assigned to two or more treatments. A study may not necessarily use one of the four techniques discussed above.

The differences between probability (random) sampling and non Probability (non random) sampling are summarised below.

Probability (Random) sampling	**Non-probability (Non-Random) sampling**
Allows use of statistics, tests hypothesis	Exploratory research, generates hypothesis
Can estimate population parameters	Population parameters are not of interest
Eliminates bias	Adequacy of the sample can't be known
Must have random selection of units	Cheaper, easier, quicker to carry out

(f) Matrix sampling

We conclude this section by describing a sampling procedure that is very often used in evaluation studies because of the need to have several items on the measuring instrument.

Four sampling situations are shown in the Figures below.

(a) Census

In the following illustration, there is a total population of 500 items to be administered to a population of 1000 respondents.

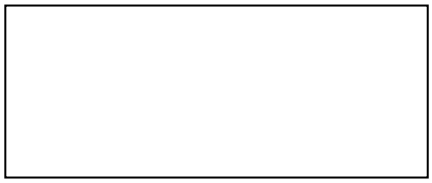
Items Most ideal but costly, time consuming. There is no Respondents need for parameter estimation.

Figure 11.3: A census of respondents an items

If all items are administered to all respondents then there is a census of respondents and questions as shown in Fig 11.3. If all respondents were to answer all items, there would be 1000 x 500 = 500000 responses to be analyzed. This is the situation of a census of the items as well as the respondents.

(b) Sampling of respondents

Items (Questions)



Less expensive and less time consuming

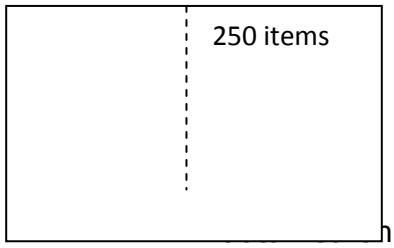
Respondents ---------- than (a) above. Ideal in situations where the

items (questions) are not too many.

Figure 11.4: Sampling of respondents

The strategy in (b) above is to sample respondents (say 500) and administer all the 500 questions to them. This gives the respondent item responses of 500 x 500 = 250000 responses to be analyzed. The disadvantage is that each of the 500 respondents selected to make up the sample of respondents responds to each of the 500 items. Responding to so many items can lead to invalidity and non-reliability of the responses. However data is obtained from each item.

(c) Sampling of items



Here, items are sampled and administered to the entire population. This model is not very useful, as information cannot be all the items.

Respondents

Figure 11.5: Sampling of items (Questions)

The strategy in Fig 11.5 (i.e. in c) is to sample say 250 items and then administer these to all of the 100 respondents. This is item sampling and as in the case of b), yields 1000 x 250 = 250000 item responses to be analyzed. Although approaches in b) and c) yield the same number of item responses, they are not usually statistically equivalent and c) is rarely used. This is because individual item data is relatively more important in measuring instrument (test or questionnaire) construction than individual respondent data.

(d) Non-overlapping matrix sampling

A fourth approach known as non-overlapping matrix sample is depicted in Fig 11.5 below. It combines the item and respondent sampling approaches by drawing random samples from both the respondent and item populations.

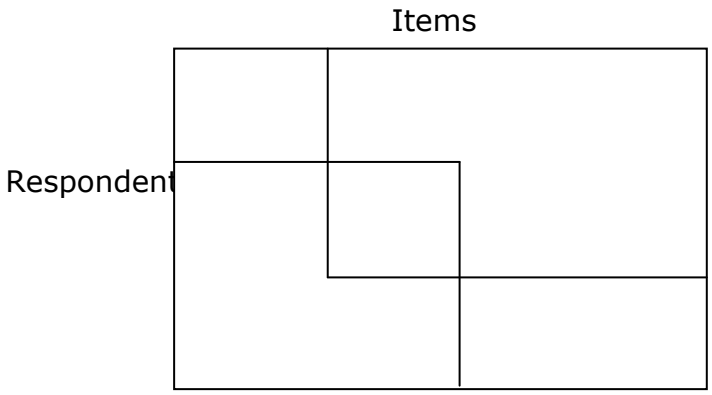


Figure 11.6: Sampling of respondents and items

Here, as before 500 items are to be administered to 1000 respondents. The 500 items are divided into five groups of 100 items each. The respondents are also divided into five groups each consisting of 200 respondents. The five groups of items are randomly assigned to the five groups of respondents. Here, each respondent answers only 100 items providing greater reliability of the responses.

Extensive Literature is available on the methods for estimating parameters using the matrix sampling. The above exposition to sampling procedures was simply to make the researcher aware of the different sample selection procedures. The reading list provided should be useful to those interested in sampling theory.

Sampling bias

However much the researcher collects a sample using the very best techniques, it neither does nor guarantee that the sample will be perfectly representative of the population.

The sampling errors beyond the control of the researcher may exist. For example, the sample may have fewer males or females. However if selected well and large enough, chances are that the sample will be highly similar to the characteristics of the population.

Sampling bias does not necessarily result from non-randomization; chance differences between the samples and the population may exist and cause bias. The use of non-probability sampling techniques is the major source of sampling bias.

Determination of the sample size

One may be forced to ask; how do you know how large a sample should be? The answer to that question is "large enough" because if the sample is too small, then the results of the study may not be generalized to the population. The results may hold only for the sample and may not be the same results that would have been obtained if the entire population was to be used. As far as the hypothesis is concerned if the sample is not large enough, the wrong decisions may be made concerning the validity of the hypothesis.

Need for sample size determination

A sample, which is too small, may affect the generalizability of the study regardless of how well the sample is determined. At what size does the sample stop being small and becomes' large enough'. That's the question. The problem is that in most cases, the researcher does not have access to many subjects. In fact to obtain permission to involve the students in the study, or finding adults willing to participate in the study is generally not an easy task.

Non scientific approaches

There are some guidelines that can be used or applied in order to determine what size sample is big enough. This depends on/upon the type of the research involved.

It is important to note that since qualitative research involves intensive study of individuals, a small number is usually required and most cases. The researcher does not determine the sample size in advance.

For descriptive research, it is common to sample from 0 to 20 percent of the population, although this range may change with size of the population studied. The bigger the population, the smaller the % chosen for the sample size. In reality, the appropriateness of sample size depends on a number of factors such as the specific of descriptive research involved, the size of the population, and whether data will be analyzed for the given sub-groups.

As a rule, the larger the sample, the more consistent and accurate is the estimation of the parameters in question. The larger the sample, the more likely it is to be representative of the target population from which it comes, provided it is randomly selected. In general, the minimum number of participants believed to be acceptable for a study depends on the type of research involved. For instance, for a survey research these should be at least 100 subjects in the researcher's study in each major sub-group.

In correlation research, it is generally desirable to have minimum of between 30 or 50 participants. In the ex-post-facto research or causal comparative research and experimental research, a minimum of between 10 and 30 subjects or participants in each a group or condition to be compared is acceptable.

The safest way to ensure that the sample is representative of the desired population is to use a random selection procedure by the researcher. The researcher can also use a stratified random sampling procedure to make sure that she/he has proportional representation of population sub-groups; for example sexes, races, religions.

The required sample size can be decided with statistical precision depending on how concerned one is with sampling error and the degree of confidence desired about the representatives of the sample.

There are two factors which influence the choice of sample size namely;

- The level of precision desired, that is to say, the larger the sample, the smaller the sampling error.
- The standard error of the parameter being measured.

The researcher may also use the following rule of thumb, which has been applied by many researchers in determining sample size;

- Whatever the sampling technique used, it should include a range of the units under the study.
- If required sample sizes are large and time is limited it is useful to study in depth at least a small proportion of the units in the sample. A questionnaire schedules could be destined to 300 people while in-depth interviews or observations could be conducted on 30 persons.

Using tables

Tables have been developed that the researcher can used in selecting the appropriate sample sizes. However, these tables require some prior information namely the number of individuals in that target population. One such table is presented in Appendix A.

Example 11.9

If the population size is 10, then the sample size to be considered will be 10, so that the sample becomes representative of the population from the same table for a population of 260 people the suggested sample size is 155; for a population of 1600 the sample size is 310, and for a population of 20,000 the sample size is 377.

Hence estimating the sample size by means of tables is very easy and needs very little information.

- The larger the population size, the smaller the percentage of the population needed to get representative sample.
- The larger the population size, the smaller the percentage of the population required to get a representative sample.
- From smaller populations say N = 100 or less, there is little point in sampling; survey the whole population
- For smaller population <100, there is little point in sampling. Survey the entire population.
- If the population size is around 500,50% of the population should be sampled.
- If the population size is around 1,500, 20% should be sampled.
- Beyond a certain point (about N = 5,000), the population size is almost irrelevant and a sample size of 400 will be adequate.

6.5 Calculations of sample size

One main reason why a sample and not a census is usually taken for the estimation of population parameters is the lack of adequate resources (besides time constraints). Hence, the accurate determination of the minimum sample size required for a given maximum error becomes important. This will prevent the researcher from being wasteful.

Sample size for the estimation the population mean

When we write the (1 -a) x 10O% confidence interval of the mean as

$$\overline{X} \pm Z_{\alpha/2}\frac{S}{\sqrt{n}}$$ (large sample size)

The quantity $Z_{\alpha/2}\frac{S}{\sqrt{n}}$ is called the maximum error, and we will denote it by ℓ

i.e. $\ell = Z_{\alpha/2}\frac{S}{\sqrt{n}}$

The above equation enables us to determine the sample size n for a predetermined maximum error ℓ with a certin level of confidence (1 - a) x 100% and a given or estimated standard deviation. It can be stated that, given the confidence level and the standard deviation of the population, the sample size that will produce a predetermined maximum error ℓ of the confidence interval estimate of the population mean, is μ

$$n = \frac{\left(Z_{\alpha/2}\right)^2 \sigma^2}{\ell^2}$$

If σ is not known as is often the case, taking a sample of some reasonable size and calculating the sample standard deviation S from a pilot study can estimate it. Its value then substitutes the value of c.

Example 11.10

The Cameroon Census Bureau wants to estimate the mean family size for all Cameroonian families with a 95% confidence. By taking a random from the population. the sample standard deviation for the family size of the sampled families is 2. How large a sample should the Bureau select if it is to estimate the mean family size to within 0.05 of the population mean?

The Census Bureau wants the 95% confidence interval for mean family.

size to be $\overline{X} \pm 0.05$

This means that the maximum error is 0.05. The value of Z $Z_{\alpha/2}$ for the 95% confidence interval is 1.96. The value of S, given as an estimate of (5IS 2. Therefore using the equation above, we have,

$$n = \frac{(1.96)^2(2)^2}{(0.05)^2} = 6146.56$$

The interpretation of this calculation is that if the Census Bureau takes the sample of size 6146156(6l47) and constructs the 95% confidence interval, the maximum error for estimating average family size in Cameroon will be about 0.05. Note that the sample size is always rounded [0 the next whole number since sample size cannot be fractional.

Sample size for estimating the population proportion

The determination of the sample size needed for the estimation of the population proportion for a given maximum error is similar to the procedure that was used in the case of the sample size for estimating the population that was used in the case of the sample size for estimating the population mean. The (1 – ɑ) x 100%, confidence interval for population proportion is

$$p \pm Z_{\alpha/2}\sqrt{\frac{[pq}{n}} \text{ when } \pi \text{ is not known.} \qquad \textbf{11.6}$$

and thus $$\ell = Z_{\alpha/2}\sqrt{\frac{pq}{n}} \qquad \textbf{11.7}$$

When π is known, the maximum error of p of the interval estimate of proportions is

$$\ell = Z_{\alpha/2}\sqrt{\frac{\pi(1-\pi)}{n}} \qquad \textbf{11.8}$$

We can solve for n from the above equation to obtain

$$n = \left(Z_{\alpha/2}\right)^2 \pi(1-\pi) \qquad \textbf{11.9}$$

We notice that to determine n, we need to know $Z_{\alpha/2}$ for a given confidence level, ℓ the maximum error and p, the estimate. Both $Z_{\alpha/2}$ and ℓ are predetermined but π must be estimated since it is usually not know.

Two approaches are often used to solve this problem

(a) We can make a conservative estimate of the sample size by using π = 0.5 (and 1 - π = 0.5O). This combination gives 0.50 x 0.50 = 0.25, which is the greatest product π of (1- π) for any value of π, since any other value of π gives (l- π) < 0.25.

(b) Alternatively, we can take any sample of an arbitrary size and calculate p and q for this sample and then use the values to p and q to find n for given confidence level and maximum error. The value of p replaces, pin the equation

Example 11.11

The Census Bureau of the previous exami5le wants to estimate the proportion of families that have more than 3 children. What is the sample size needed to do this estimation with 99% confidence with a maximum error to within 0.03 of the population proportion? The confidence interval for the population in this problem is p± 0.03 and thus ℓ = 0.03. The value of $Z_{\alpha/2}$ for (1- α) x l00%. = 99% is 2.58 from the standard normal distribution. For the most conservative estimate of n, we take π = 0.50 and 1 - π = 0.50

Hence

$$n = \frac{\left(Z_{\alpha/2}\right)^2 \pi(1-\pi)}{\ell^2}$$

$$= \frac{(2.58)^2(0.50)(0.50)}{(0.03)^2} = 1849$$

Thus if the Bureau takes a sample of at least 1849, the estimate of π will be within 0.03 of the population proportion.

Example 11.12

We shall reconsider example 11.11 but take the second alternative of approximating π by p calculated from a sample taken from the population Suppose a sample had been taken and it was found that 30% of the sample had more than 3 children. Then p = 0.30 and q = 1-0.30 = 0.70 and the required sample size for the same confidence and maximum error becomes

$$n = \frac{\left(Z_{\alpha/2}\right)^2 pq}{\ell^2} = \frac{(2.58)^2(0.03)(0.70)}{(0.03)^2}$$

= 1553.16 = 1554

(sample size decimals are always approximated upwards to the next whole number independent of the decimal, why?).

Review Questions

1. Discuss the advantages and disadvantages of sampling methodology in social science research and what should be the characteristics of a good sample?
2. Analyze non-probabilistic sampling methods in social research.
3. Distinguish among the different types of probabilistic samples.
4. How would you go about selecting a sample using the following sampling approaches (a) Simple Random (b) Stratified (c) Cluster (d) Systematic and (e) Matrix?
5. The determination of sample size is very important in research methods. Discuss the different approaches available for sample determination.

Unit 7
Research Instruments
7.1 Introduction

Measurement is the process of transforming abstractly conceived concepts or variables into numerical quantities. It involves quantifying observations about a quality or attribute of a thing or person. Three steps identified in the process of measurement include:

- Identifying and defining the quality or attribute that is to be measured.
- Determining a set of operations by which the attribute may be made manifest, perceived and operationalised.
- Establishing the set of procedures and definitions for translating observations into quantitative statements or degree of amount.

Measurement process is an integral part of social research. One can have brilliant theories and research studies that are perfectly constructed in every detail, yet social research will be a failure if these concepts are not adequately measured. Measurement is not limited to the use of highly developed and refined instruments. Any differentiation among members of a class of things that is expressed numerically illustrates a process of measurement of procedure. Indeed, there is a close correspondence between the scientific maturity of a discipline and the degree to which the relevant variables and concepts in that discipline can be measured objectively and accurately.

The degree of accuracy needed in measurement is related to the purpose served by measurement.

Purpose of research instruments

Research instruments are meant to translate attributes or traits into quantities. In educational settings, for example, the purpose served by research instruments can be classified into four categories: (Hopkins, 1998).

Instructional purpose

Instruments provide a means of feedback to the instructor and the student. This helps the instructor provide more appropriate instructional guidance for the individual students. Students whose teachers incorporate systematic measurement such as continuous assessments and regular classroom tests and evaluation procedures into their instructional design tend to have considerably higher achievement than students whose teachers do not use these procedures (Fuchs and Fuchs, 1986).

7.2 Research and evaluation

Tests are necessary to determine whether an innovative programme is better or poorer than the conventional one in facilitating the attainment of specific curricular objectives. Standardized achievement or constructed measures have been regularly used for evaluating the success of new programmes.

Guidance functions

Instruments are of value in diagnosing an individual's special aptitudes and abilities. Obtaining measurement of scholastic aptitude, achievement, interests and personality is often an important aspect for the counseling process.

Scholastic aptitude and achievement scores have repeatedly demonstrated their value in identifying secondary school students who are or are not likely to success at university level. Certain jobs require special skills that are best assessed by well-designed instruments, and such instruments serve as main criteria for identifying gifted, learning – disabled or retarded children.

Administrative purposes

Instruments facilitate better classification and placement decisions. Grouping of children by their ability levels is an example of classification for which measurement can be of value. Reading readiness instruments can be helpful for placing young children in the proper classes, sections or groups.

In providing mechanisms of "quality control", national or local norms can provide a basis for assessing certain curricular strengths and weaknesses. If a school district does not have a means for periodic self-evaluation, instructional inadequacies may go anointed. The evidence suggests that when instruments identify a curricular deficiency, substantial improvement occurs when the school staff sets a specific improvement goal in a subject field.

Instruments in the cognitive, effective, psychomotor domains

Research instruments can be distinguished in terms of measures of maximum performance (achievement, intelligence and aptitude tests) known as cognitive ability, measures of typical performance (attitude. interest and personality inventories), known as performance in the affective domain, and ability to tap skills and manipulative ability(e.g. singing, dancing, boxing), known as psychomotor skills (Benjamin 1964).

The goal of cognitive measurement is to obtain an examinee's best. maximum, and highest level of performance. The goal of affective measurement on the other hand, is to assess an examinee's usual, representative and typical behaviour, reaction and attitudes. Psychomotor measures elicit ski-ll. Standard measuring instruments are available in each of these domains but they can also be constructed, validated and their reliability established by the researcher.

Instruments in the cognitive domain

Cognitive tests measure intellectual process such as thinking, memorizing. problem solving, analyzing, reasoning, and applying information. Most of the tests in the educational system are cognitive, measuring achievement and aptitudes.

7.3 Achievement tests

They are designed to provide information, about how well test takers have learned what they have been taught, and are typically applied in school settings. An individual's level of achievement on a standardized or constructed achievement test

is usually determined by comparing it to the norm, the performance of a national group of students in the individual's grade or age level who took the same test.

Thus, these tests can provide comparison of a given student to similar students nationally. Standardized achievement or constructed tests may typically test a number of different curriculum areas such as reading. vocabulary, language and mathematics.

Some achievement tests, such as the Gates-McGnitie reading Test, focus on achievement in a single subject area. Sometimes diagnostic achievement tests are used to investigate specific weaknesses in subject area that need remedial instruction. A diagnostic test is a type of achievement test that yields multiple scores to facilitate identification of a students weak and strong areas. For example, the Stanford Diagnostic Reading test and the Key Math Diagnostic Inventory of Essential Mathematics Test are widely used diagnostic achievement tests.

Aptitude tests

Aptitude tests are cognitive measures that are commonly used to predict how well an individual is likely to perform in the future. Tests of general aptitude are also referred to as scholastic aptitude tests and attests general mental ability. Aptitude tests are standardized and are often administered as part of a school-testing programme. They are also used extensively in job training. Entrance examinations fall in this category.

General aptitude tests require a participant to respond to a variety of verbal and non-verbal tasks intended to measure the individuals ability to apply knowledge and solve problems. Such tests often yield three scores; an overall score, a verbal score and a quantitative score. If there is a reason to question the appropriateness of a group test for particular test takers, for example, very young children or students with disabilities, an individual test may be used.

Probably, the most well known of the individually administered tests are the Stanford-Biflet Intelligence Scale and the Wechsler Scales. The Stanford-Binet is appropriate for the young children and adults. Wechsler Scales are available to measure the intelligence. Other commonly used individually administered aptitude tests are McCarthy Scales of Children's Abilities and the Kaufman- Assessment Battery for Children (ABC) Test.

Instruments in the affective domain

Affective tests are designed to assess individual feelings, values, and attitudes toward self, others, activities, institutions, and situations. They are often used in educational and other social research and exist in many different formats. Most affective tests are non projective; that is, they are self-report measures - the test taker responds to a series of questions or statements about herself or himself. For example, a question that asks, "Which would you prefer, reading or playing basketball? Circle your answer." requires the test taker to report his/her preference.

Self report tests are frequently used in survey or descriptive studies (for example to describe the personality structure of various groups such as high school dropouts), correlation studies (for example, to determine relationship between various personality traits and other variables such achievement), and experimental studies (for example, to investigate the comparative effectiveness of different instructional methods or different personality types in the acquisition of a concept).

Instruments that examine attitudes, interest, values, and personalities tap affective, emotive feelings, and perceptions. Values are deeply held beliefs about ideas, persons, or objects. Attitudes indicate what things we feel favourable or unfavourable about. Interests indicate the degree to which we seek out or participate in a particular activity, objects, and ideas, Personality, also called temperament, is made up of a number of characteristics that present a person's typical behaviour and describes what we do in our natural life circumstances.

Attitude scales

Attitude scales determine what an individual believes, perceives, or feels about self, others, activities, institutions, or situations. There are five basic types of scales used to measure attitudes: Likert scales, Semantic differential scales, rating cales, Thurstone scales and Guttman scales. The first three are thmost often used.

Likert scale

The Likert scale statement is followed by the five-category response continuum: Strongly agree, Agree, Undecided, Disagree, strongly disagree. The examinee selects the response that best describes his or her reaction to each statement; the response categories are weighted from 1 to 5 and averaged for all the items.

Likert scales are very flexible and can be constructed more easily than most other types of attitude scales. To generate items, it is often helpful to role-play and put yourself in the shoes of a typical examinee to construct statements that typify positive and negative attitudes. Ordinarily. the items are a mixture of statements that represent positive and negative attitudes; this reduces an examinee's tendency to respond with a certain mental set.

Semantic differential scale

A semantic differential scale requires an individual to give a quantitative rating to a topic such as attitude toward school or attitude toward smoking.

Scales of bipolar adjectives such as good-bade friendly unfriendly, and positiveflegatiVe are presented and the respondent indicates the point on the continuum that presents his or her attitude. For example, a scale concerning attitudes toward property taxes might include the following items.

Necessary ……Unnecessary

Fair ……..Unfair

Better ……Worse.

Each position of the continuum has an associated score value; by totaling score values for all items, it can be determined whether the respondent's attitude is

positive or negative. Semantic differential scales usually have 5 to 7 intervals with a neutral attitude assigned a score value of 0.

Rating scales.

Rating scales are also used to measure attitudes towards others. Such scales require an individual to rate another individual on a number of behavioural dimensions. One form of rating scale provides descriptions of performance or preference and asks the individual to check the most appropriate description. Rating scales are not different from Likert scales. Whereas Likert scale use a standard set of response options that represent varying degrees of agreement rating scales use descriptive that pertain to each question.

Thurstone and Guttman Scales

Thurstone scale requires participants to select from a list of statements that represent different points of view on a topic. Each item has an associated point value between 1 and 11; point values for each item are determined by averaging the values of the items assigned by a number of judges.

An individuals attitude score is the average point value of all the statements checked by that individual. Guttman scale also asks respondents to agree or disagree with a number of statements. A Guttman scale, however, attempts to determine whether an attitude is one- dimensional. It is one-dimensional if it produces a cumulative scale in which an individual who agrees with a given statement also agrees with all related preceding statements. For example, if you agree with statement 3, you also agree with statement 2 and 1.

Interest inventories

Interest inventories require participants to indicate personal likes and dislikes, such as the kinds of activities they prefer and those they do not prefer. The respondents patterns of interest are compared to the interest patterns typical of successful persons in various occupation fields. They may be used for comparative purposes or

for the description of the typical interests of the group. Inventories are widely used to suggest the fields in which respondents might be most happy and successful.

Two most used inventories are the Strong-Campbell Interest Inventory and the Kuder Preference Record-Vocational. The Stron ampbell Interest inventory examines areas of interest in occupations, school subjects, activities, leisure activities, and day-today interactions with various types of people. Test takers are presented with many topics related to these five parts and they are asked to indicate whether they like (L), dislike (D), or are indifferent (I) to each topic.

The Kuder Preference Record-Vocational addresses 10 broad categories of interest: outdoor, mechanical, computation, scientific, persuasive, artistic, literary musical, social service, and clerical. Individuals are presented with three choices and must select the one they most like and the one they least like.

The Strong-Campbell and Kuder Preference Record-Vocational are both self-report instruments that provide information about a persons' interests. Scoring the interests requires sending data to the testing companies who produce them for computer analysis. The researcher cannot score them himself/herself.

Value test

The study of /Values instruments is old, but still used. It measures the relative strength of an individual's valuing of six different areas; theoretical (discovery of truth, empirical research); economic (practice and values); aesthetic (symmetry, form, and harmony); social (altruism, philanthropic); political (personal power, influence); religious (unity of experience, cosmic coherence). Individuals are presented with items consisting of either two or four choices and are asked to allocate points to the alternatives according to how much they value them.

Example 12.1

A two-alternative item might be, "suppose you had the choice of reading one of two books. If the books were titled Making money in the stock Market and the Politics of

Political Power, which would you read first?". Respondents allocate points to the two choices indicating degree for preference. By counting up the points given to each of the choice areas, an Indication of an individuals preference among six categories can be obtained.

Q - Sort technique

A procedure by which one can also assess attitudes, interests, and other affective variables is the Q-sort techniques, originally developed by Stephenson (1953). An individual is given a set of cards containing statements, traits, pictures or whatever; they are then sorted into piles according to their relative standing along a single dimension. The major use of the Q-sort technique has been in counseling and psychotherapy.

Adjective checklists

Adjective checklists are easy to develop and easy to administer and score. One role-plays thinking of all the relevant descriptors possible of what is to be rated. If used to assess self-concept, the adjectives that are to be checked or left blank may include: Fair-, well liked, dependable-s creative- selfish-, stupid-, worthless-, and so on. Individuals or groups can thus be profiled and studied.

Psychomotor domain

Personality Inventories

Personality inventories, list questions or statements that describe behaviours characteristic of certain personality traits. Respondents indicate whether each statement describes them. Some inventories are presented as checklists; respondents simply check items they feel characterize them. An individual's score is based on the number of responses characteristic of the trait being measured. An introvert, for example, would be expected to respond "yes" to the statement, "Reading is one of my favourite pastimes5" and "no" to the statement, "I love large parties". Personality instruments may measure only one trait or many.

Projective tests

Project tests were developed in part to eliminate some of the problems inherent in the use of self-report and forced-choice measures. Projective tests are ambiguous and not obvious to respondents. Since the purpose for the test is not clear, conscious dishonesty of respondent is reduced. Such tests are called projective because respondents project their true feelings or thoughts into ambiguous stimulus. The classic example of projective test is the Inkblot or Rorschach test. Respondents are shown a picture of an inkblot and are asked to describe what they can see in it. The most commonly used projective techniques is the method for association. Participants react to stimulus such as a picture, inkblot, or word on which they project their interpretations. Word-association tests are probably the most well known of the association techniques. Similarly, the Thematic Appreciation test presents the individual with series of pictures; the respondent is then asked to tell a story about what is happening in each picture.

Until recently, all projective tests were required to be administered individually. There has been some recent efforts, however, to develop group projective tests. One such test is the Holtzman Inkblot Techniques, which is intended to measure the same variables as the Rorschach Inkblot Test.

From the preceding comments, it should not be a surprise that projective tests are utilized mainly by clinical psychologists and very infrequently by social researchers. This is due to the fact that administering, scoring, and interpreting projective tests require lengthy and specialised training. One needs to be specially educated to use projective testing.

7.5 The questionnaire

The Questionnaire is a carefully designed instrument for collecting data in accordance with the specifications of the research questions and hypotheses. It consists of a set of questions to which the subject responds in writing.

A questionnaire may also be described as a self-report instrument used for gathering information about variables of interest in an investigation. A questionnaire is often a one time data-gathering device on the variables of interest to the researcher.

In summary, a questionnaire therefore is a form consisting of interrelated questions prepared by the researcher about the research problem under investigation, based on the objectives of the study.

From the above definitions, three things are assumed.

- That respondent can read and understand the question or items.
- That respondent possesses the information to answer the questions or items.
- That respondent is willing to answer the questions or items honestly.

Strengths and weaknesses of questionnaires

Strengths

The questionnaire as a tool for data collection method is less expensive compared to other methods. This is because the questionnaire can be mailed to the respondent to fill in, and also mailed back to the researcher for analysis.

Questionnaires, especially mailed ones are filled at the respondent's convenience. This increases the chances of getting valid information. Questionnaires with personal administration with on-the-spot collection are advantageous in that they produce quick results. This enables the researcher to complete the work within the stipulated time.

Questionnaires offer greater assurance of anonymity. In the case where the researcher is handling a sensitive topic like corruption in an organisation, the target sample can give sensitive information without fear, as their identity is not needed on the questionnaire.

Questionnaires may cover a wide geographical area since researchers approach respondents more easily through questionnaires than any other method.

Weaknesses

Questionnaires do not allow probing, prompting and clarification. This is so because the researcher may prefer to send the form to the respondents. This means that any item, which is not clear, is left unanswered. This reduces the validity of the results.

Questionnaires do not offer chances for motivating the respondent to participate in the process of filling the questions. This sometimes lowers the rate of the questionnaires that are returned to the researcher.

The identity of the respondent is concealed and the conditions under which questionnaire was answered are not known. This makes it uncertain whether the right people in the targeted sample filled the questionnaire or not.

Questionnaire items are fixed. This means that they do not provide an opportunity to collect additional information while they are being completed. For example, what is your level of education? (A) Primary, (B) Secondary, (C) Tertiary, (D) Degree. The above example shows that a respondent is not given chance for additional information to explain other issues concerning their education.

Due to lack of supervision, items in the questionnaire are Sometimes partially tilled. This affects negatively the validity of the results. Therefore questions of the questionnaire should be constructed with care in order to serve their intended role of eliciting right responses from the respondents.

The Dos and Don'ts of a questionnaire.

Questionnaire construction is a very demanding task, which requires not only methodological competence, but also extensive experience with 'research and questioning techniques.

When questionnaires are carelessly or haphazardly designed, respondents lose interest in filling them, and the researcher becomes biased about questionnaires as a method of collecting data. Therefore, the following Dos and Don't should be kept in mind when designing a questionnaire.

Have a good knowledge of your variables in order to be able to phrase your questions properly and appropriately. A questionnaire must depict the central elements of research topic including the indicators of the independent, dependent and extraneous variables.

A questionnaire should deal with an important research problem, which motivates the respondents to give responses. For example, an investigation into the burning of schools is a contentious issue to which respondents would readily provide information.

The questionnaire should seek data, which cannot be obtained from other sources like books, reports and the Internet. This information concerns things like; attitude, feelings, interests and opinions. For example, if someone wants to find out the attitude of girls towards mathematics, she/he has to go to the field to discover their views.

The size of the questionnaire should be reasonable to cover the content of the variables and their indicators without being unnecessarily long.

A questionnaire therefore should be as short as possible. It should be intended to get only that information which is relevant to the study. However, it should be as much comprehensive as necessary so that it does not leave out any relevant and crucial information. The golden rule with respect to the size of the questionnaire is that one should include the most relevant questions in as few pages as possible.

The layout of the questionnaire should be as attractive in appearance as possible through the neat arrangement of the contents.

In questionnaire construction, the researcher should use simple language appropriate to the respondents level.

The questionnaire should be pre-tested not only for its validity but also for its clarity so that the researcher has a good understanding of the level of comprehension of the respondents.

The respondents' ego should be protected by tactfully asking questions that seem to make them feel uncomfortable. For example, how many times they have a quarrel in their family in a month. Such questions may lead to unrealistic information or failure to return the questionnaires.

In forming the questions, either suggest all possible alternatives to the respondents or do not suggest any. In case you want to know about the staple food of a particular tribe, your may ask: How many times in a week do you eat fufu? You may or may not provide alternatives to this question.

Decide whether the question should be closed or open-ended. However, it is suggested that open-ended questions should be limited so that the questionnaire items take limited time of the respondent to fill. Closed- ended questions are also easier to fill and analyze.

Questions should be phrased in a way that makes them objective and no answers should be suggested in the question. This is because it biases the respondent. For example: Do you think the movement should construct more roads in your area or not? Such questions are subjective to the researcher's views.

Questions should have a single reference. That is, ask one question at a time, but not so many at once. Avoid questions like: state and explain your attitude towards UPE. Such questions are bulky that they lower the morale of the respondent to fill the questionnaire.

Organize the questions in a logical order, which is easy to follow when filling the questionnaire. This increases the number of those who fill the questionnaire to completion.

Provide a rationale for the items so that the respondent understands their relevance to the study. That is, reasons for carrying out the study should be provided at the beginning of the questionnaire.

When moving to a new topic, include a transitional sentence to help respondents switch their trend of thought to the new developments.

Don'ts

In questionnaire construction, the researcher should avoid the following:

- Long questions may be ambiguous and confusing. This hinders the researcher from getting the desired responses.

- Avoid ambiguous wording. Words like: regularly, always, rarely, often and usually may have vague meanings and may not therefore elicit accurate responses.

- Avoid double-barrelled questions. Question should contain one idea at a time to avoid ambiguity. Long and complicated items are difficult to understand and this may make the respondent unwilling to fill the questionnaire.

- Avoid yes or no questions and instead, ask those questions that begin with why? How? What? Where? These seek the opinion of the respondent.

- Avoid negatively stated items because they are likely to be misread by the respondent. The negative would tend to be overlooked and the respondents might give an answer that is opposite to their real opinion.

- Do not put important items at the end of a long questionnaire. This is because the respondent may be tired by the time he/she reaches them yet they are important to the study.
- Do not ask for one's identity if the questions are very personal or threatening. The assurance of anonymity increases the respondent's confidence in answering the questions.

- Personality questions should be avoided. For example questions on sexual behaviour, cheating, corruption, and bribery should be voided. If they cannot be voided, care should be taken in phrasing them to void bias.

When the dos and don'ts of the questionnaire are respected, the questionnaire should have the following qualities:

- It should be well organized,
- It should have clear questions
- It should have exhaustive well drawn response options and,
- It should have a natural ordering in the flow of the questions.

7.5 Open and closed ended questions.

The way the questions are constructed makes them either closed-ended or open-ended. However, whether closed or open, researchers must consider the following points when constructing the questions; clarity, using generally adaptable language and setting objective-oriented questions.

Open-ended questions

Open-ended questions are items which call for a free response in the respondent's own words. No clues to the answers are given. They provide for greater depth of response where respondents give their personal views and attitudes about the item of research. Hence, the range of responses is not tightly defined. Open questions can also be referred to as unstructured or unspecific questions. An example of an open question could be: what is the most commonly used method in teaching math

to young children? This allows the respondent to freely express his/her views. Open questions are used in research because of the advantages they have.

Advantages of open-ended questions

They are preferred in exploratory studies in which the researcher has limited or no clues on the likely responses. Unstructured questions offer the researcher this missing information.

In case it does not make sense to anticipate the responses of the target population it is better to use unstructured questions. For example, if the researcher wants to find out the views of the people about multiparty politics in this country. it is better to use unspecified questions.

Open questions give freedom and spontaneity of expression to the respondents and the consequent rapport. This encourages validity of the responses.

Disadvantages of open-ended questionnaires

The alternatives may be too lengthy or too many to give the questionnaire an attractive appearance it is supposed to have. This may also bring in another problem of making the questionnaire very expensive to construct, type and produce. It is difficult to make comparison across groups of respondents, as each individual gives different views.

There is also a possibility of forgetting momentarily or inadequately stating the main points at the time of completing the questionnaire. This affects the reliability of questionnaire.

Quantification of the responses is difficult. This is because a lot of information may be given which makes it difficult for the researcher to code it.

Attaching codes to different response categories is time consuming and may lead to loss of information as a variety of responses may be combined into one category for convenience.

it requires greater effort on the part of the respondent to think out the answers. This affects negatively the number of questionnaires that are returned.

Answers to open questions are often difficult to interpret, tabulate and summarize in the research report.

Closed - ended questions

In close-ended questions, the researcher provides alternatives or short responses to the questions. The researcher may also ask questions which require short responses. For example. the researcher may inquire about the marital status of the respondents. and give the following alternatives for respondents to1oose from. (A) Married, (B) divorced, (C) widowed. (D) single. (E), specify any other. Such questions tie the respondent down to the provided alternatives.

Advantages of close-ended question.

They elicit specific responses, which are easy to analyze. For example, it is easy to provide a list of things that motivate workers at their places of work then analyze why those things motivate them.

Structured questions are preferred if comparison among different groups of respondents is important for the study. This is because all respondents consider the same universe of content.

Structured questions are preferred if the respondents are more competent in reading than they are in writing. This is because it requires the respondent to put a tick on the right alternative.

They are economical in terms of time. This is so because they are easy to fill in, which takes little of the respondent’s time and that of the researcher in administrating and analyzing them.

Disadvantages of close-ended questions

Close-ended questions may lead to loss of spontaneity and expressiveness In the respondents. This is because respondents are not given a chance to express themselves.

There is loss of rapport among the respondents when the available alternatives fail to do justice (e.g. absence of important categories) to their ideas and opinions. This makes them fill the questions carelessly.

There is a possibility of biasing the respondent by forcing them to choose among given alternative and of suggesting ideas that were not in their minds. This betrays the major importance of using questionnaires, which is to get factual information.

Other types of questions Facts and opinion questions

Questions of fact require factual information from the respondent. These questions do not make any reference to the respondent's opinion or attitude about the items.

These are Questions of opinion and attitude and seek the informant's opinion, attitude and preference about a phenomenon. For example, why do you prefer multiparty system of governance to begin this year? This question calls for the respondent's opinion about the issue of multiparty politics.

Primary questions

These solicit information, which is directly related to the research topic. Each question provides information about a specific aspect of the topic. That is, an indicator of a particular variable. For example, if the topic is about motivation, the primary question may be: what motivates you in your work?

Secondary questions

These do not relate directly to the research topic. They provide information on secondary issues such as consistency of opinion or reliability of the instruments used. They do not add anything new about the research topic. They ensure

methodological soundness, integrity of the questionnaire or truthfulness of the respondents.

Tertiary questions

These establish a framework that allows convenient data collection and sufficient information without exhausting or biasing the respondent.
Questions under tertiary may either be padding or probes.

Padding questions

These allow the respondent to relax and take a breath after or before answering sensitive questions.

Probing questions

These are used in interviewing to amplify or expand information given by the respondent to stimulate and guide the discussion and establish a friendly atmosphere free of bias.

Direct and indirect questions

Direct questions seek personal information about the respondent; for example, do-you respect your marriage partner?

Indirect questions are used when the respondent is unwilling to offer direct information on the research topic. In such cases, indirect questions make it easy for the respondent to answer. For example, do people of your age and status respect their marriage partners?

Filter and contingency questions

Filter questions aim at eliciting information related to the general aspect of the research topic for the first time in the study, for example, do you drink alcohol? Contingent questions are more specific and are geared towards eliciting more information on an issue already presented in the filter question. For example, how

many times do you drink alcohol in a week? A contingency question should always come after a filter question.

7.6 The different components of the questionnaire

There are set standards and principles upon which questionnaires are constructed. The following are the components of a questionnaire and their indicators.

The cover letter

This is either the first part of the questionnaire or a letter that goes along with the questionnaire. It contains the following elements:

- The main objective, indicating the significance and the justification of the study.
- It introduces the purpose of research to the research team and to the respondents.
- It clarifies any doubt or mistrust the respondent may develop about the study by assuring them of anonymity and confidentiality
- It assures the respondents that the research will be geared towards improving their condition
- It gives instructions for the completion of the questionnaire and
- It spells out issues related to ethics.

Once the components of the cover letter are logically included in the questionnaire, it increases the rate of response and completion of all the items of the questionnaire. Even the way the cover letter addresses the respondent e.g. Dear Sir, Madam, Jones, House holder. The colour of the paper used, the form of the letter head and the style and format of the letter are important. The researcher therefore, should be very careful with the way she/he designs a cover letter.

Instruction

This is the second part of the questionnaire. It is characterized by A brief description on how to fill the questionnaire. This includes: the total time required to

fill the questionnaire how to fill the questions e.g. by ticking the right alternative, providing a brief response or giving ones views.

This section should encourage the respondents to fill all the elements of the questionnaire by assuring them that there is no right or wrong answer. Therefore no particular response is targeted.

The instructions also guide the respondent on what to do with the filled in questionnaire. It guides the respondent whereby how to send the filled m questionnaire. Instructions are written in a simple and clear language to make the respondents aware of what to do with element of the questionnaire.

Biographical information

This is personal data of the respondent that is crucial in the analysis and interpretation of data. It may include: sex, age, income, experience, and type of school, occupation, qualifications and class in school, marital status. Sensitive personal information like: widowhood, divorce, may not be easily obtained. Therefore, the researcher should get this information indirectly.

Otherwise direct questions on personal issues may discourage respondents from filling the questionnaire.

The main body

This area deals with the Substantive content of the research topic questions arising from the independent variable, the dependent variable and the extraneous variable, sections, taping the indicators of these three variables.

(a) Dependent variable(s). The dependent variable is the variable of primary interest in the study. It5 the variable whose effect is being studied. From theory' or from the Conceptual perspective several indicators (resulting in sever1 questions/item5) of the dependent variable should be developed

(b) Independent variable. independent variables are those variables that are manipulated and used as explanatory factors in the study. Indicators of independent variable should be developed from theory

(c) Extraneous variables. These are variables that influence the dependent variables but are not of interest in the study. They should be identified and their indicators developed so that they can be controlled for during analyses

Gratitude

This section ends the questionnaire. The researcher should note that the respondent is not obliged to answer the questionnaire. Therefore, ii he takes time off his Work to fill the questionnaire, she/he should be thanked for it.

Administering the questionnaire

Usually the investigator cannot get a ready-made questionnaire that is appropriate for the study. This obliges him or her to prepare one. There are three modes of administering questionnaires; namely Personal administration with collection-on-the spot, mailing and personal administration wits collection after a time interval.

Personal administration with on- the -spot- collection

The researcher delivers the questionnaire in person and waits for the respondent to complete it and she/he goes back with it. This mode has the following advantages: It ensures delivery and return of the questionnaires.

When filling in the questionnaire the respondent can seek clarity on unclear issues. This ensures accurate responses.

It puts the researcher in control of the time for completing the research project.

Disadvantages

However, it also has the following disadvantages:

- It is tiresome for the researcher to move from one respondent to another

- It is uneconomical in terms of resources and time
- The respondent may be biased by the presence of the researcher, which affects the validity of the responses.
- The respondent may not have all answers on spot. This implies that some question items will remain unanswered.

Mail questionnaires

Under this mode, a fully constructed questionnaire is sent by post to the respondent, who is expected to complete it and send it back to the researcher by post. Such questionnaires should be very attractive with clear print, logical flow of the questions, encouraging the respondent to send back the questionnaire from and if possible, giving small tangible gifts like cards to the respondent.

Advantages

It saves the researcher from moving long distances to deliver the questionnaires and picking them.

They are preferred when socially sensitive responses are inevitable such that personal contact may increase the likelihood of faking answers.

Anonymous questionnaires increase the chances of obtaining valid but socially unacceptable responses.

Respondents who have busy schedules can receive them. Hence utilizing all the targeted population.

Disadvantages

They usually produce very poor response rates and low percentage returns and reduce the sample size, thus making it difficult to generalize results to the whole sample.

Since the researcher is not available to clarify any ambiguities and misinterpretations, mail questionnaires are not suitable to persons of low intelligence or low educational background.

They are demanding on the side of the researcher who has to pilot test them several times to minimize misinterpretation and moreover, are very expensive.

The researcher has no control over the time it would take to receive all the responses. (This makes it hard for him to plan when to begin analyzing data.

Personal administration with collection after time interval

The researcher delivers the questionnaires to the sampled population and collects them after some time. This mode has the following advantages:

It gives the respondent ample time to answer the questionnaire items. It is also preferred when the questions require the respondents to consult other sources like; documents, textbooks, individuals, and Internet. This leads to appropriate and effective responses.

Disadvantages

The researcher may fail to go back to places where he delivered the questionnaire and some respondents may not be available when he returns to collect the filled questionnaires yet other respondents may simply not have filled the questionnaire.

This may oblige him to base his findings on a small sample size, which reduces the reliability of the results.

Time and money may be wasted in repeated travels to trace those who have the questionnaires. This prolongs the time when the researcher has to complete the research project.

Close consultation among those who got the questionnaires may occur which leads to giving similar answers. This affects the validity of the answers.

E - mail questionnaires

The researcher puts the questions on the web for the respondents to fill, The advantages of this mode include:

Postal and transport costs are eliminated. Also, the possibility of missing data with questionnaires is eliminated, and there is no need to transfer data manually from the questionnaire onto an electric format and cross check for possible error.

They allow collection of data from large sample size. This increases the reliability of the results.

Internet questionnaires can be designed to be interactive that is. Items can be tailored to the individual respondent, and the respondents can be given feedback as they complete the items

However, web questionnaires too have limitations.

The researcher needs to have access to a web server, and ability to use specialized software to design the questionnaire, to process incoming data, and to guard against data security breaches and multiple submissions or from an individual not in the sample. This type of questionnaire protects the privacy of the participant.

In general, a questionnaire is a powerful evaluation tool that should be designed with a lot of care. The effectiveness of the questionnaire depends on how well the researcher understood the objectives of his research, how well the questions were phrased, the local flow of the questions within the questionnaire and the methods used to analyze data. Questionnaires have made the task of collecting and extracting valuable material more efficient. However, a questionnaire is as good as the questions it contains.

Guides for the collection of qualitative data

The above presentation has centred mainly on instruments for quantitative data. Instruments for qualitative data include observations, interviews, group discussions, case studies, exploratory studies and field studies. The use of each of these

instruments requires careful planning through the use of well-designed guides for each before data collection begins.

Review Questions

1. Discuss the functions of instruments in educational research.
2. Analyze research instruments in the cognitive domain.
3. Analyze research instruments in the affective domain.
4. Analyze research instruments in the psychomotor domain.
5. Analyze the dos and don’ts of questionnaires
6. A researcher intends to develop a questionnaire to measure attitude of children towards school. What would you advice on its structure?

Unit 8
The Validity and Reliability of Research Instruments
8.1 Introduction

Validity and reliability are two important concepts in the acceptability of the use of an instrument for research purposes. In brief, validity refers to the appropriateness of the instrument while reliability refers to its consistency in measuring whatever it is intended to measure. They should normally be established before the research.

Validity

That valid measurement is essential to successful scientific activity is widely accepted among science methodologists, theoreticians, researchers and philosophers (Keeves, 1988). Validity is the most important idea to consider when preparing or selecting an instrument for use. After all, inferences cannot be made from data that has been collected with instruments not serving the purpose for which the instruments are intended. All researchers want the information they obtain through the use of an instrument to serve their purposes.

Example 13.1

To find out what teachers in a particular secondary school in a given District think about a recent policy passed by the board of governors, researchers need both an instrument to record the data and some sort of assurance that the information obtained will enable them to draw correct conclusions about teacher opinions. The drawing of conclusions based on the data obtained by the use of an instrument is what validity is all about.

A test or instrument is not valid per se; it is valid for a particular purpose and for a particular group. The question is not "valid or invalid" but rather "valid for what and for whom?" A valid test of biology achievement is not very likely to be a valid personality test, with respect to the 'for whom' respect of validity. A test, which is a valid measure of vocabulary for primary school pupils, is certainly not a valid measure of knowledge of vocabulary for university students.

Since tests are designed for a variety of purposes and since validity can be evaluated only in terms of purpose, it is not surprising that there are several different types of validity: face, content, construct,- concurrent and predictive. Because of the different ways in which they are determined, they are classified as either logical or criterion-related validity.

'Logical validity includes face, content and construct validity and is so named because validity is determined primarily through judgment.

Criterion-related, or empirical validity includes concurrent and predictive validity and are so named because in each case, validity is determined by relating performance on an instrument to performance on another criterion. Criterion-related validity is determine in a more objective manner than content validity. Assessment of construct validity involves both judgment and external criteria. For any instrument is important to seek evidence concerning the appropriate type of validity, given the intended purpose or purpose of the instrument.

Concepts of validity

Validity is the ability to produce findings that are in agreement with theoretical or conceptual values; in other words, to produce accurate results and to measure what is supposed to be measured. A research instrument is said to be valid if it actually measures what it is supposed to measure. Rulers, thermometers, measures of weight and other instruments used to measure the physical world have demonstrable validity.

Put in a slightly different way, validity means that it is true that the instrument measures what it is supposed to measure and that the data collected honestly and accurately represents the respondent's opinions. An instrument intended to measure the attitude of children towards-school should not be seen to be measuring rather performance in school. A valid measure is supposed to produce true results that reflect the true situation in the conditions of the environment it is supposed to measure.

The validity of an instrument can be checked in two ways: empirical validation and theoretical validation. With empirical validation, the validity of a measure is checked against empirical evidence. For theoretical validation, the validity of an instrument is ascertained through theoretical and conceptual constructs. In both cases, validity is upheld if the findings produced through the measure in question are supported by empirical evidence or by theoretical principles.

8.2 Types of and procedures for establishing validity

Face validity

The following questions could help introduce us to the discussion of face validity: Is it (true) valid "on its face"? What is the opinion of a respondent or a non-expert about the instrument?

At the most basic level, when little or nothing is known about the variable being measured, the level of validity obtainable is called face validity. "On the face of it" merely establishes that the tool seems an appropriate way to find out what is being measured. Looking at the questions, the researcher has developed to ask his/her respondents, one can say, "I think I will find out what I want to know by asking these questions. It looks all right."

Example 13.2

A questionnaire aimed at studying attitude towards school has face validity if its questions refer to attitude towards school. The standards of judgment here are not based on empirical evidence but on general theoretical standards and principles and on the subjective judgment of the researcher or respondents.

Caution should be taken when using face validity because it is the lowest level of validation and is used only when the researcher is beginning to study a particular concept and has no prior research literature to refer to. If there is literature on the variable, either theory or research, then face validity is not sufficient. If the

researcher chooses to study a variable that has not been studied before, he/she will usually start with face validity but the establishment of validity will have to go beyond this level.

Content validity

Fundamentally, content validity focuses upon the extent to which the content of an instrument corresponds to the content of the theoretical concept it is designed to measure. Establishing content validity, therefore, involves specifying the domain of the content for the concept and constructing and selecting indicators that represent that domain of content.

Content validity refers to the degree to which the test actually measures or is specifically related to the traits for which it was designed. It shows how adequately the instrument samples the universe of knowledge, skills, perceptions and attitudes that the respondent is expected to exhibit. In educational setting, for example, the basis for content validity is careful examination of course textbooks, syllabi, objectives and judgments of subject matter specialists.

While it is true that content validity is the degree to which an instrument measures an intended area, we should note that content validity requires both item validity and sampling validity. Item validity is concerned with whether the test items represent measurement in the intended content area and sampling validity is concerned with how well the test samples the total content area. A test designed to measure knowledge of biology facts might have good item validity, because all the items do indeed deal with biology facts, but might have poor sampling validity. For example, if all the items deal only with vertebrates.

An instrument with good content validity samples the appropriate content area. This is important because we cannot possibly measure each and every aspect of certain content area. And yet researchers would wish to make inferences about performance in the entire content area based on performance on the items included

in the test. Such inferences are possible only if the test items adequately sample the domain of possible items.

Content validity is thus important primarily in achievement testing and various tests of skills and proficiency, such as occupational skills tests.

Example 13.3

A test of achievement in primary seven mathematics will have high content if the items covered on the test are representative, in type and proportion of the content presented in the course syllabus. If test items cover topics not taught in the course, ignore important concepts and unduly emphasize others as compared with their treatment in the course, the content validity will be questionable.

Content validity is determined by expert judgment. Usually experts in the area covered by the instrument are asked to assess its content validity. These experts carefully review the process being used in developing the instrument as well as the instrument itself and make judgment concerning how well items represent their intended content area.

This judgment is based on whether all sub areas have been included and in the correct proportions. In other words, a comparison is made between what to be included in the instrument, given its intended purpose, and what is actually included. An important question then is "how do we establish a Content Validity Index (CVI)'?

We use judges to establish a validity index for each item. We must know how many of the judges say that the item is valid.

Example 13.4

If for example we had five judges and three of these agree that the item is valid then the inter-judge Coefficient of Validity would be

CVI=(no of judges declared item valid)/(total no of judges)

13.1

3/5 = 0.6

The 0.6 here is the inter-judge coefficient of validity for the item. This is repeated for all the items of the instrument and an average computed. For the overall instrument

CVI=(no of items declared valid)/(Total no of items)

13.2

For the instrument to be accepted as valid, this average index should be 0.7 or above.

Secondly, there is the intra-judge coefficient of validity. Here the same expert will judge the validity of the items of the instrument more than once and a rating on each of the items as well as the overall validity index on all the items. It is of course assumed that in subsequent rating of the items the expert does not remember or use information on previous ratings.

Construct validity

Construct validity focuses on the assessment of whether a particular measure relates to other measures consistent with theoretically derived hypotheses concerning the relationships among the concepts. Cronbach (1946) observes that: "construct validation takes place when an investigator believes his instrument reflects a particular construct to which are attached certain meanings. The proposed interpretation generates specific hypotheses, which are a means of confirming or disconfirming the claim." Thus of necessity construct validity is assessed within a given theoretical context.

Psychological concepts - such as intelligence, anxiety, and creativity are considered hypothetical constructs because they are not directly observable but rather are

inferred on the basis of their observable effects on behaviour. For example, it was always observed that some students learn faster than others, learn more, and retain for longer periods. To explain these differences, a theory of intelligence was developed, and it was hypothesized that there is something called intelligence, which is related to learning and which everyone possesses to a greater or lesser degree. Tests were developed and designed to measure how much of it a person has. As it happens, students whose scores indicate that they have a "lot" of it, that is, they have high IQ; tend to do better in school and other learning environments.

Establishing construct validity; involves the following steps:

a) Developing a theory defining concepts and anticipating relationships among them;
b) Selecting indicators that represent each concept contained within the theory;
c) Establishing the dimensionality nature of these indicators;
d) Constructing scales for each of the respective sets of indicators;
e) Calculating the correlations among these scales;
f) Comparing these empirical correlations with the theoretically anticipated relationships among the concepts and
g) Factor analyzing these indicators and rotating them to simple structure allows the researcher to identify the factors or constructs(Amin, 2004)

Example 13.5

A study is to be carried out on the attitudes of children towards school and a questionnaire has been developed to measure attitude. Three constructs (emotion, Action and Belief) are developed from the concept of attitude. So that the questionnaire on attitude is structured as follows, where a, b, c, d, e. f. g, h, i. j, k are indicators of the different constructs

Emotion: a, b, c

Action : d, e, f, g

Belief :h,i,j,k

There are two approaches to checking construct validity here:

One is through expert judgment. In this approach, the researcher gives the questionnaire to an expert without indicating the constructs to which the indicators a, b, c, d etc belong. If the judgment of the expert coincides with the pre-determined assignment of the indicators to the different constructs, then the questionnaire is construct valid.

In a second approach, the data from the respondents are factor analyzed. A factor analysis of the indicators (items) is done to determine the inter- correlations among the items. Rotation to simple structured is made so that the loading on only one of the factors by the items is maximized. In this case each of the items a, b, c, . . .k is seen to belong to only one factor. If in the case of the above example, three factors emerge, with loading of a, b and c on one factor, d, e, f ,g on a second factor and h, i, j, k on a third factor, the questionnaire is said to have construct validity. Factor analysis is treated in greater detail in a later chapter.

Criterion - related validity

Criterion-related validity focuses upon the correlation between scores on an instrument and scores on some criterion variable. Thus, criterion- related validity is the degree of correspondence between the scores on the instrument to be validated and the criterion. If this correlation is high, the instrument is considered to be criterion-related valid for that criterion. There are two types of criterion-related validity; concurrent validity and predictive validity.

Concurrent validity

Concurrent validity of a newly constructed instrument is obtained when this new instrument correlates with an earlier instrument that has been constructed and established to be valid for similar purpose.

Example 13.6

Instrument A is a new instrument to be validated and B an old instrument whose validity has been established, both intended to measure intelligence. The two instruments would be administered to the same group of respondents and the

correlation calculated. The magnitude of the correlation would give the extent of concurrent validity of the new instrument A.

Concurrent validity of an instrument describes a criterion-related validity situation where an established valid instrument exists. For example, a researcher might wish to establish a questionnaire to measure the awareness of students about their performance in school during the past year. If an established and validated awareness instrument exists, it could be administered concurrently with this new questionnaire and the validity of the new questionnaire ascertained.

Here are the steps for establishing concurrent validity:

a) Administer the new instrument to a defined group of respondents.
b) Administer a previously established valid instrument that has been established for similar purposes to the same group, at the same time or shortly thereafter.
c) Correlate the two sets of scores and

The resulting index, or validity coefficient, indicates the concurrent validity of the new test; if the coefficient is high(>.6), the test has good concurrent validity.

The discrimination method of establishing concurrent validity involves determining whether test scores can be used to discriminate between persons who posses it to a greater degree (Gay, 1996). For example, a test of mental adjustment would have concurrent validity if scores resulting from it could be used to correctly classify institutionalized and non institutionalized persons.

Predictive validity

Predictive validity-is the degree to which a test can predict how well an individual will do in a future situation. Predictive validity is extremely important for tests that are used to classify or select individuals. Much educational research is concerned with the prediction of success in various activities. For instance, the predictive validity of the common entrance examination into secondary schools administered

by some countries, is the extent to which such an examination predicts success at secondary school.

The predictive validity of an educational instrument depends on a number of factors such as the curriculum involved, textbooks used, , the teaching methods used the subject matter etc.,. Thus if an instrument is to be used for prediction, it is important to compare the description of the manner in which it was validated with the situation in which it is to be used.

No instrument has perfect predictive validity. Therefore predictions based on the scores of any test will be imperfect. There will always be error of prediction. However predictions based on combination of several test scores will invariably be more accurate than predictions based on scores of any one test. Therefore, when important classification of selection decisions is to be made, they should be based on data from more than one indicator.

How do we determine the predictive validity of a test? The predictive validity of a test is determined by establishing the relationship between scores on the test and of measure of success in the situation of interest. The test used to predict success is referred to as the predictor, and the behaviour predicted is referred to as the criterion. In establishing the predictive validity Of a test, the first step is to identify and carefully define the criterion.

The criterion selected must be a valid measure of the behaviour to be predicted. For example, if we wished to establish the predictive validity of an algebra test, final examinations scores at the completion of the course in algebra might be considered a valid criterion. The main problem with predictive validity is that the criterion is measured from only a subset of the sample from which the original measures were taken. If the predictive validity of the common entrance examination is required, the correlation between it and the performance would only be for the students who passed to college and not everyone who wrote the common entrance examination.

8.3 Steps in establishing predictive validity

Once the criterion has been identified, the procedure for determining predictive validity is as follows:

- Administer the instrument to be validated, to a sample of a given population;
- Wait until the behaviour to be predicted occurs, this is the criterion behaviour;
- Obtain measures of the criterion for the same group.
- Correlate the two sets of scores;
- Evaluate the results.

The resulting index, or validity coefficient, indicates the predictive validity of the instrument. If the coefficient is high, the instrument has good predictive quality.

It is important to note that a combination of predictors should be used to predict the criterion. This is because the use of single factors may create a large amount of error in the prediction effort.

Before we conclude our discussion on predictive validity, there are few things to note. The first is that the procedures for determining concurrent validity and predictive validity are very similar, the major difference is in terms of when the criterion measure is administered. In establishing concurrent validity, it is administered at the same time as the predictor, or within relatively short period of time; in establishing predictive validity, one usually has to wait for a much longer period of time to pass before the criterion data can be collected.

Occasionally however, concurrent validity is substituted for predictive validity in order to save time and to eliminate the problems of keeping

Example 13.7.

We might administer a mechanical aptitude test to a group of mechanics and correlate scores on the test with some measure of their skill. The problem with this approach is that we would be dealing only with those who made it! Persons for whom the test would have predicted a low probability of success would not become

mechanics. Put in a different way, most of the persons in the sample would be persons for whom the test would have predicted success. Therefore the resulting validity coefficient would probably be an underestimate of the predictive validity of a test.

In this discussion of both concurrent and predictive validity there was a statement to the effect that if the resulting coefficient is high, the test has good validity. Many researchers have at one time or other wondered, "How high is high?" the question of how high the coefficient must be in order to be considered "good' is not easy to answer. There is no magic number that a coefficient should reach. In general it is a comparative matter. A coefficient of 0.50 might be acceptable if there is only one test available designed to predict a given criterion; on the other hand, a coefficient of 0.50 might be inadequate if there other tests available with higher coefficients. In any case , the significance of such a correlation must be verified by regular hypothesis testing procedures such as explained by Amin(2004).

The reliability of an instrument

Reliability is dependability or trustworthiness and in the context of a measuring instrument, it is the degree to which the instrument consistently measures whatever it is measuring.

An instrument is reliable if it produces the same results whenever it is repeatedly used to measure trait or concept from the same respondent even by other researchers.

In educational settings, reliability may be defined as the level of internal consistency or stability of the measuring device over time.

In classical test theory, the reliability of a test refers to how much measurement error is present in the score yielded by the test. The more reliability a test is the more confidence we can have that the scores obtained from the test are essentially the same scores that would be obtained if the test was re-administered. The level

of reliability that the researcher should expect from a test is determined largely by the nature of the research in which he plans to use the measure.

Reliability of a domain-referenced test is defined as the consistency of the test in making estimates of the examinee's level of mastery of the test's domain, selection of items is only concerned with selecting items that fit into the domain as defined.

Reliability is also characterized by precision and objectivity.

While validity tells test users about the appropriateness of a test, reliability tells about the consistency of the scores produced. However, a valid instrument is always reliable but a reliable instrument is not necessarily valid.

Social scientists are interested in achieving internal reliability and external reliability. Internal reliability means consistency of results within that site or organization. External reliability refers to consistency and reliability of data across different organizations.

Qualitative researchers have problems of reliability because of the subjective nature of their work. To achieve reliability in qualitative research extra effort must be made.

Steps to internal reliability

- Use simple descriptors.
- Use multiple researchers whenever possible.
- Create a careful audit trial (record of data that can be followed by another scholar back from conclusions to raw data).
- Use participant researchers or informants to check the accuracy of congruence of perception.
- Use mechanical recording devices where possible (and with permission).

Steps to external reliability

- Clearly specify the researchers' status or position so that readers know exactly what point of view instigated the data collection.
- Cler1y state who informants are (or what role they play in the natural context) and how and why they were selected or chosen (while maintaining confidentiality).
- Carefully delineate the context or setting boundaries and characteristics so that the reader can make judgments about similar circumstances or settings.
- Define the analytic constructs that guide the study (describe specific conceptual frame works used in design and deductive analysis).
- Specify the data collection and analysis procedures meticulously.

However, regardless of the significance of these approaches, it is generally believed that qualitative research does not provide as high reliability as does quantitative research.

Reliability is expressed numerically, usually as a reliability coefficient, which is obtained by using a correlation. A high reliability coefficient indicates high reliability. If an instrument were perfectly reliable, the coefficient would be 1.00 meaning that the respondent's true score is perfectly reflected on her or his true status with respect of the variable being measured.

If the coefficient is .00 it indicates no reliability. The reliability coefficient reflects the extent to which a test is free from error variance. Error variance may be defined as the sum effect of the chance differences between persons that arise from factors associated with a particular measurement.

Reliability must be carefully considered in selecting instruments for use in research. It is always desirable to have high instrument reliability in order to make valid inferences from the instrument. This is because scores with zero reliability are all measurement error and so there is no true score component. Measurement error is

defined as the difference between an individual's true score on a test and the scores that he/she actually obtains on it over a variety of conditions.

A point that must be watched for in evaluating an instrument reliability is that the instruments yield a number of sub scores in addition to a total score like in intelligence and achievement tests that provide sub-scores in order to give a profile of the student's performance in the various areas making up the test. It should however be noted that reliability is often reported only for the total score.

This means that if a questionnaire is constructed a dependent variable attitude which has three subscales; emotion, action and belief, it would be important to have the reliability of the attitude scale as well as reliabilities of the three subscales.

As a check look for developed /standardized instruments that have demonstrated reliability, look for whether authors report measures of internal consistency (i.e. are the items' responses consistent across constructs?) and test-retest correlations (i.e. Are the scores stable over time when the instrument is administered a second time?). Also, determine whether there was consistency in the test administration and scoring (i.e. were errors caused by carelessness in administration or scoring?).

13.6 Types of and procedures for establishing reliability

There are a number of different types of reliability and are each determined differently.

(a) Test-retest reliability/stability

Test-retest reliability is also called stability reliability. It refers to the degree to which scores on the same test by the same individuals are consistent over time. It provides evidence that scores obtained on a test at one time (test) are the same or close to the same when the test is re-administered some other time (retest).

Procedure for determining test-retest reliability

There are basically four steps to follow when determining Test-retest reliability and they include:

1. Administer the test to an appropriate group.
2. After sometime has passed, say two weeks administer the same test to the same group.
3. Correlate the two sets of scores and
4. Evaluate the results.

If the resulting coefficient referred to as the coefficient of stability is significant, and is high, then the test has good test-retest reliability.
The most critical problem in calculating this form of reliability is to determine the correct delay time between the two administrations of the measure. If the retest is administered too quickly after the initial test, respondents will recall their responses to many of the items, which will tend to produce a seriously high reliability coefficient.

On the other hand, if the retesting is delayed for too long a period, there is a good possibility that the respondents' ability to answer some items will change due to intervening learning or maturation. It is therefore important when test-retest information is given concerning an instrument, to give the time interval between testing and the actual coefficient.

Problems associated with test-retest reliability are taken care of by what is referred to equivalent forms reliability.

(b) Equivalent-forms reliability/parallel form or alternate forms reliability

Parallel form reliability can also be called equivalent form reliability or alternate-forms reliability (Hopkins, 1998).

Equivalent forms of an instrument are two instruments that are identical in every way except for the actual items included. The two forms measure the same

concept; have the same number of items, the same structure, the same difficulty level, and the same directions for administration, scoring and interpretation.

Equivalent form reliability also referred to, as alternate-form reliability is an approach to estimating tests score reliability in which the forms of the test are administered. Suppose, for example, that two researchers each develop their own test, and with the intent of measuring the same construct. Each test has the same number of items, but they differ in content and style. In this case, there will be measurement errors in estimating individuals' true scores on the construct that the tests are designed to measure.

Procedure

- Administer one form of the test to an appropriate group.
- At the same session, or shortly thereafter, administer the 2nd form of the test to the same group.
- Correlate the two sets of scores and
- Evaluate the results.

If the resulting coefficient of equivalence is high, the test has good equivalent forms reliability. If the two forms of the test are administered at different times, the resulting coefficient is referred to as coefficient of stability and equivalence.

Procedure

This method of calculating reliability may be used whenever two or more parallel forms of test are available. It is computed by administering two parallel forms of the test to the same group of individuals and then correlating the scores obtained from the two forms. The two forms of the test may be administered at a single sitting, or at an interval between the administrations of the forms. This interval tends to reduce practice effects that may be an important factor if the two forms of the test are administered at the same sitting.

The major problem with equivalent-form reliability is the difficulty of constructing two forms that are essentially equivalent and yet lack of equivalence is a source of measurement error. The other problem is that it is not always feasible to administer two different forms of the same test, or even the same test twice.

There are other methods of estimating reliability that require one test.

(c) Internal consistency

Internal consistency is a commonly used form of reliability that deals with one test at one time. It is conceptualized through four different approaches: Split-half reliability (subdivided test) Kuder-Richardson method of rational equivalence, Cronbach's Alpha and Hoyt's analysis of variance procedure which is less often used.

Each approach provides information about the consistency among thc items in a single test. This explains why sources of measurement errors such as differences in testing conditions are eliminated.

i) Split-half reliability/sub divided test

It is a commonly used type of internal consistency reliability. Split-half reliability involves breaking single test into two halves. It is especially appropriate when a test is very long or when it would be difficult to administer either the same test at two different times or two different forms to group. Since split-half reliability procedures required only one administration of a test, certain sources of errors of measurement are eliminated like differences in testing conditions.

Procedure

- Administer the total test to a group.
- Divide the test into two comparable halves or sub sets - the most common approach is to include all odd items in one half and all even items in the other half.
- Compute each subject's score on two halves. Each subject will consequently have two scores, a score for the odd items and a score for the even items

- Correlate the two sets of scores
- Apply the Spearman Brown prophecy formula.
- Evaluate the results.

To determine the coefficient of internal consistency, test scores are split into two subsets, usually by placing all odd numbered items in one subset and the even items in one Set. The scores of the two subsets are then computed for each individual, and these two sets of scores re correlated. The correlation obtained, however, represents the reliability coefficient of only half the test, and since reliability is related to the length of the test, a correction must be applied ;in order to obtain the reliability of the entire test.

The correction formula, Which is used, is the spearman -Brown Prophecy formula given by.

$$r_{xx} = \frac{2r'xx}{1+r'xx}$$

Where

r'_{xx} = the correlation between the two halves and

r_{xx} = split-half reliability coefficient

Example 13.8

Suppose that a test of 30 items has been constructed so that correlation coefficient between two halves (15 even and 15 odd items) test was 0.80. The 0.80 would be based on the correlation between scores on 15 even items and 15 odd items and would therefore be an estimate of the reliability of a 15-item test not a 30-item test. The Spearman - Brown formula would need to be applied to estimate the reliability (r) of the 30 - item test.

$$r\ (totaltest) = \frac{2r(splithalf)}{1+r(splithalf)}$$

$$r \text{ (totaltest)} = \frac{1(.80)}{1+.80}$$

$$= \frac{1.60}{1.80} = 0.89$$

Therefore the split half estimate of .80 was corrected to an estimated of 0.89. The disadvantage with this formula is that it tends to give a higher estimate of reliability than would be obtained using other procedures, that is to say that the correction formula over corrects. The second problem lies in the definition of the halves.

ii) The method of rational equivalence

This is another method for estimating a test's internal consistency. It is the only widely used technique for calculating reliability that does not require the calculation of a correlation coefficient. This method gets at the internal consistency of the test through an analysis of the individual test items. It requires only a single administration of a test.

A number of formulas have been developed to calculate reliability using this method, which are generally referred to as Kuder-Richardson formulas, after the authors of an article in which these formulas were first discussed. Formulas in the article are numbered but the most two commonly used include KR2O and KR2 1 (Hopkins, 1998).

iii) Kuder - Richardson formulas (KR_{20} & KR_{21})

Application of a Kuder - Richardson formulas results in an estimated of reliability that is essentially equivalent to the average of the split half reliabilities, computed for all possible halves. Formula 20 is a highly regarded method of assessing reliability, and formula 21 is an easy - to - apply approach, which provides an estimate of the KR2O reliability. Both formulas require that each item be scored dichotomously, i. e. Correct or incorrect, true or false.

Formula 20 is considered by many specialists in educational and psychological measurement to be the most satisfactory method of determining reliability. It is given by

$$KR20 = \frac{k}{k-1}\left[1-\frac{\Sigma pq}{\sigma^2}\right]$$

Where

p is proportion passing a given item.

q = 1 – p and σ^2 = standard deviation of whole test.

The pq values are summed over all the k items to obtain Σ pq.
Note that the items must be dichotomously score (correct or incorrect) and omitted items taken as incorrect.

Example 13.10
Suppose for a 4 – item test, the proposition of correct answers were .9, .8, .7, .2 and the statement deviation given as σ = .9

then
Σ pq = (.9) (.1) + (.8) (.2) + (.7) (.3) + (.2) (.8) = .09 + .16 + .12 + .16 = .62

$$KR_{20} = \frac{4}{4-1}\left(1-\frac{.62}{.9^2}\right)$$

= 1.3 (-1 - .76) = .313

Formula KR_{21}, is a simplified approximation of formula KR_{20} and it is of value primarily because it provides a very easy method of determining a reliability coefficient. It requires so much less time than other methods for estimating test reliability that is highly appropriate for use in teacher• made tests and short

experimental tests. Its application also usually results in a more conservative estimate of reliability, especially if more than one trait is being measured. The formula is as follows,

$$KR_{21} = \frac{k}{k-1}\left(1 - \frac{\mu(k-\mu)}{k\sigma^2}\right)$$

Where μ = means on the test

σ = standard deviation

k = number of items

Example 13.11

Support for a 40 item test,

σ = 5 and μ = 30

When

$$KR_{21} = \frac{40}{40-1}\left[1 - \frac{30(40-30)}{40X5^2}\right]$$

$$= \frac{40}{39}\left(1 - \frac{30x10}{40x5x5}\right)$$

$$= \frac{40}{39}(1-.3) = \frac{40}{39}(.7) = .72$$

One desirable aspect of the Kuder - Richardson formulas is that they generally yield a lower reliability coefficient that would be obtained by using the methods described thus they can be thought of as providing a minimum estimate of reliability of a test.

iv) Cronbach's coefficient alpha (σ)

This is a general form of the KR_{20} that can be used when items are not scored dichotomously, for instance both multiple - choice tests and easy tests include

items that have several possible answers, each of which is given a different weight in this case therefore Alpha is the appropriate method for computing reliability.

$$\alpha = \frac{k}{k-1}\left[1-\frac{\sum\sigma_k^2}{\sigma^2}\right]$$

Where $\Sigma\sigma_k^2$ is the sum of the variances of the k parts (usually items) of the test.

σ = standard deviation of the test.

When the parts are individual items, α = KR_{20}. When the parts are halves α is the split – halve reliability coefficient.

Example 13.12

A test is divided into 5 parts with standard deviations 3, 2, 4, 2, 3.

The sum of the variances of the k = 5 parts is

$\Sigma\sigma_k^2 = 3^2 + 2^2 + 4^2 + 2^2 + 3^2 = 9 + 4 + 16 + 4 + 9 = 42$

If the standard deviation of the total test is then $\sigma^2 = 121$

and $\alpha = \frac{5}{5-1}\left(1-\frac{42}{121}\right) = .81$

v) Hoyt's an1ay15 of variance procedure

It is occasionally mention in the research literature and is rarely used, however since it produces exactly the same results as KR20 and is more difficult to compute.

(d) Scorer / rate reliability

There are others situations for which reliability must be invested such situations usually occur when the scoring of tests involves subjectivity, such as with essay tests, short-answer tests involving more than one word response, rating scales and

observation instruments so concerned with interjudge (interjudge reliability refers to the reliability of two (or more) independent scorers.

Intra-judge reliability refers to the reliability of the scoring of the same judge on more than one occasion individual scores.

Scoring and rating are sources of errors of measurement and it is important to estimate the consistency of scores assessment. Estimates of interjudge or intrajudge reliability are usually obtained using correlation techniques or expressed simply as percent agreement.

8.4 Factors that affect reliability

Factor, which affect reliability, are in three categories i.e. errors of measurements, reliability coefficient and standard Error of measurement.

Error of measurement

The error of measurement refers to the difference between an individual's true score on a test and the scores that he / she actually obtains on it over a variety or conditions.

Errors of measurement that affect reliability are random errors, systematic or constant error which also affect validity. If an achievement test was too difficult for a given group of students, all scores would be systematically lowered. The test might, however, yield consistent scores i.e. might be reliable. In other word the scores might be systematically lowered in the same way every time.

This illustrates an interesting relationship between validity and reliability; valid test is always reliable but a reliable test is not necessarily valid. We can analyze reliability by considering factors that might cause measurement error to include;

1. A tests items are only a sample of the total domain of possible items that might be used to represent the ability, trait, attitude, or other construct

being measured. Measurement error can result if different items on the test are not equivalent in how they sample the construct domain.

2. Test administrators may introduce measurement error by failing to administer the test consistently most likely if the testers have not been well trained or if the test is individually administered and requires interaction between the tester and the examinee.
3. Test scorers may create measurement error by not following consistent scoring procedures.
4. Measurement error can also result if the person using the scoring key is careless.
5. Testing conditions, such as a noisy or excessively warm room, may cause individuals to perform atypically in the test.
6. Machines that scores tests can cause measurement errors if they are celebrated inaccurately or if students have made pencil marks that the machine cannot detect.

Standard error of measurement

Standard error of measurement is an estimate of how often one can expect errors of given size. As the reliability becomes higher, the error becomes smaller thus tests of low reliability' are subject to large error Standard error of Measurement can also be regarded as an index of a test's reliability. It can be determined directly from the reliability coefficient and the standard deviation of the test score.

Standard Error of measurement helps us to understand that the scores we obtain on tests are only estimates and can be considerably different from the individual's "true score"

Review Questions

1. Why are validity and reliability so important in research instruments?
2. Critically examine the different types of validity.
3. What procedure would you adopt for establishing the validities?
4. Critically examine the different types of validity.
5. How would you establish the different types of reliability indices.
6. Examine the different approaches of internal consistency to reliability.

Unit 9
Preparing, Presenting and Summarizing Data
9.1 Introduction

After the data have been collected and before analysis begins, it has to be prepared depending on the outline laid down for the purpose at the time of developing the research plan. Preparing data for analysis means making it as error free as possible. This is important because it ensures that the researcher has cleaned up all relevant data for making contemplated analysis.

In this era of vulgarized computer use in data analysis, preparation for analysis of data includes editing, coding, computer data entry and the verification of the accuracy of the data entered onto the computer so that they are amenable to analysis. Preparation of data also requires transformation of variables through new variable creation by computing, counting and recoding. Preparation may also involve file manipulation such inserting variables of cases, merging files, splitting or sorting of files.

The term analysis (processing for some researchers) involves a number of closely related operations, which are performed with the purpose of summarizing the collected data and organizing these in such a manner that they answer the research question(s) and hypotheses if they exist. Thus in the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to statistical tests of significance to determine if real differences exist. Qualitative data analysis, discussed at the end of this chapter, involves searching for patterns of relationship that exist among data.

Process operations

The process of preparation for data analysis involves the following operations:

Editing

This is a process of examining the collected raw data (specially in surveys) to detect errors and omissions and to correct these when possible. Editing involves a careful scrutiny of the completed questionnaires and / or schedules. It is done to ensure

that the data are accurate, consistent with other data gathered, uniformly entered as complete as possible and have been well arranged to facilitate coding and analysis.

There are two points or stages at which editing should be done:

- Field editing
- Central editing

Field editing

This type of editing is necessary in view of the fact that individual writing styles often can be difficult for others to decipher. For interviews and questionnaires, this sort of editing should be done as soon as possible after the interview, or after the questionnaire is collected preferably on completion of interview or questionnaire.

While doing field editing, the investigator must restrain him/herself and must not correct errors of omission by simply guessing what the informant would have said if the question had been asked. Verification of intended response with the interviewee or respondent is necessary. Documents collected in the field should also be checked on the spot for their accuracy. It is often difficult if not impossible to correct them later.

Central editing

Central editing should take place when all forms and schedules have been completed and returned to the office. All forms should get a thorough editing by a single editor or by a team of editors in case of a large inquiry. Editor(s) may correct the obvious errors such as an entry in the wrong place, entry recorded in months when it should have been recorded in weeks and the like.

In case of inappropriate or missing replies, the editor can sometimes determine the proper answer by reviewing the other information in the schedule. In some cases, the respondent may be contacted for clarification. The editor must strike out the answer if the same is inappropriate and he/she has no basis for determining the

correct answer or the response. In such a case an editing entry of 'no answer' is called for. All the wrong responses, which are quite obvious, must be dropped from the final data, especially in the context of mail surveys. Editors must keep in view the following points while performing their work:

- They should be familiar with instructions given to the interviewers and coders as well as with the editing instructions supplied to them for the purpose.
- While crossing out an original entry for one reason or another, they should just draw a single line on it so that the same may remain legible.
- They must make entries (if any) on the form in some distinctive colour and that also in a standardized form.
- Editor's initials and the date of editing should be placed on each completed form or schedule.

Coding

Coding is the process of assigning numerals or other symbols to answers so that responses can be put into a limited number of categories or classes. Such categories should be appropriate to the research problem under consideration. They must also possess the characteristics of exhaustiveness, (that means there must be a class/category for every data item) and also that of mutual exclusivity, which means that a specific answer can be placed in one and only one category. Every category is defined in terms of only one attribute.

Coding is necessary for efficient analysis and through it, several responses may be reduced to a small number of classes, which contain the critical information required for analysis. Coding decisions should usually be taken at the designing stage of the questionnaire or interview guides. This makes it possible to precede the questionnaire with choices and which in turn is helpful for computer analysis as one can straightforward enter the data into the computer from the original questionnaires.

But in case of hand coding, some standard method may be used. One such standard method is to code in the margin with a coloured pencil and the other method can be to transcribe the data from the questionnaire to a coding sheet. Whatever method is adopted, one should see that coding errors are altogether eliminated or reduced to the minimum.
The coding of open-ended questions can be especially tedious. This is especially so with large surveys. That is why it is usually prudent to minimize open-ended questions in questionnaires destined for large surveys.

However, if a question is to be coded, for each such question, the researcher should pick a random sample of questionnaires, following the sample design, identify the typical responses and code them. This process is continued until all open-ended questions have been coded.

9.2 Handling documentary data

Data from documents for example, enrolment rates, promotion and repeater rates, distributed by sex, by region and over the years must be handled with care. Special forms may need to be designed at the collection phase that will facilitate data analysis.

Computer data entry and editing

Nowadays, using computer software would do most analysis both quantitative and qualitative. For quantitative analysis, software such as

- Epi Info
- Statistical Analysis Systems (SAS)
- MINITAB
- Statistical Package for the Social Sciences (SPSS) etc, are widely used. Each of these software has very well developed subroutine for data entry.

Most of the illustration of the presentation and description of data together with the use of different techniques to verify different hypotheses will be done using the SPSS programme. The file for this purpose is presented in Appendix B as “Practice”.

Enter the data into an SPSS data editor with the following variable names, variable labels and value labels.

Variable Name	Variable Label	Value Label
Read	Reading Skill	
Write	Writing Skill	
Maths	Performance mathematics	
Ses	Socio-economic Status	1. Low SES 2. Medium SES 3. High SES
Sex	Sex of Respondent	1. Males 2. Female
Ltype	Type of Learner	1. Slow Learner 2. Fast Learner

At the level of data entry, editing can be done by

- Defining appropriate variable length. For example the variable "age" should be defined to have only two characters, so that erroneous entries for this variable like 115, 156 etc, with three digits or characters are automatically rejected.
- Definition of range. Note also that a two-digit number like 98 years, 03 years or 25 years may be a wrong entry either because it is out of range or because it has been entered wrongly. In the case of range, an acceptable range of the values of a variable can be defined so that values out of this range are signaled.
- Double entry. Some software have facilities for double entry. Here one data entry personnel first enters the data. A second entry is repeated (usually the data in the first entry is not displayed by the computer). If the second entry is the same as the first, the entry is accepted otherwise a signal draws the attention of the entry personnel to the lack of agreement. He/she can then check on the original form to find out the correct figure.

- Using frequencies to edit. If it is not possible to define the range of a variable, the frequencies of its different values in the created file can be obtained. A frequency distribution is a display of the values of a variable and the number of its occurrences. Such a display can help the researcher to identify incorrect entries.

For example if the variable "gender" has been coded as 1 for males and 2 for females, a frequency distribution may show that a wrong entry of 5 was made somewhere. The researcher would then find out the case that had the wrong entry of 5 and correct it. Perhaps the case is female requiring that it should have been a 2.

Data transformation

Missing Values

One decision that the researcher mat make is how to handle missing values. These are when some cases do not have values for a given variable. This may occur when the value is actually absent or a value out of the acceptable range (an extreme score that is) is found. Three options are available for eventual analysis.

(a) Exclude the case in all analysis even when it has data on other variables (not recommended).

(b) Exclude the case only when the analysis concerns that particular variable.

(c) Replace the missing value by some typical value e.g. mean, mode or median, depending on the level of measurement.

Compute

The modification of the data through compute allows the researcher to combine several variables to form composite variable(s) from many variables of the file. For example, the indicators of the concept 'attitude' can be added together to give a global picture of the concept.

Computing can be very general, involving addition, subtraction, division, multiplication, exponentiation and even taking logarithms of variables in the file. In any case, the combination of these variables must be conceptually meaningful.

Count

Counting creates a new variable, which is the number of occurrences of a specified attribute in a number of variables. For example, a researcher has constructed a questionnaire with 35 items each of which has the possible response: 4. Strongly Agree 3. Agree 2 Disagree 1. Strongly Disagree.

A new variable may be created which is the number of times each respondent say the strongly agree to each of the 35questions.

Recode

Data could have been collected on a variable as a continuous variable, like age ranging from 20 to 50 years. But at the level of analysis of the data, the researcher may wish to put in age groups like:

20-25; 26-30; 31-35; 36-40; 41- 45; 46- 50

It is to be noted that if the original data had been collected as a categorical variable, it would no longer be possible to get the variable in the form of a continuous variable. Therefore, if possible get your data in continuous form because transformation to categorical form is possible afterwards and not vice versa.

File manipulation

In preparing data for analysis, it may also be necessary to manipulate the research files in the following manner:

Variable and case insertion

A variable or a case may have been forgotten, necessitating its insertion to complete the file. It may become difficult to do these corrections later and this may lead to the incorrectness of the results.

Sorting cases

It may sometime be necessary to arrange the contents of the file in some order. Sorting cases in increasing or decreasing order allows the researcher to do this re-arrangement.

Merging files

Especially in large surveys, it may be necessary to do data entry in many places or by different data entry personnel. Before analysis, it may be important to put all these files together. Two scenarios emerge: there can be merging of cases where the same file structure has been used containing the same number of variables but different number of cases or files with the same number of cases but with different number of variables.

Selecting cases

The researcher may wish to do analysis by group of cases and therefore, select cases for specific analysis. Imagine for example, that a survey has been carried in four regions of the country and analysis is to be done by region. If each region has a code (which should be the case), cases, which belong to different regions, can be selected and analyzed separately.

9.3 Main problem of preparing data for analysis

The main problem in preparing data for analysis is concerned with "Don't know" (DK) responses. While editing the data, the researcher often comes across some responses that are difficult to handle. One category of such responses may be don't know response" or simple DK. response. When the DK response group is small, it is of little significance but when it is relatively big, it becomes a matter of major concern in which case, the question arises; Is the question which elicited DK response useless?

The answer depends on whether the respondent actually does not know the answer or the researcher may fail in obtaining the appropriate information. In the first case, the concerned question is said to be all right and DK response is taken as legitimate DK response. But in the second case, DK response is more likely to be a

failure of the questioning process. The best way to deal with DK responses is in the design of unambiguous questions that will result in minimizing DK responses.

Presenting data

Once the data entry and editing phase is complete, the researcher can begin to present the data by use of different graph and curve forms. The choice o the graph to use depends on the nature of the data to be presented. In general, categorical data are better presented with graphs while curves are recommended for continuous variables. In any case, the researcher must comment upon data presented in any form.

Graphs

Example 14.1

(a) Pie Charts

To use the SSS version 13.0 to produce Pie Charts

1. Open file "Practice'
2. Click on Graphs > Pie > Define
3. Select slice representation (e.g. N of cases)

   Transfer **ses** to **Define slices by**

   Select **Titles** and type an appropriate Pie Chart title (if you want the title to be displayed under the chart as below, select footnote)
4. Click on Continue >ok
5. Editing and formatting can now he done on the Pie Chart

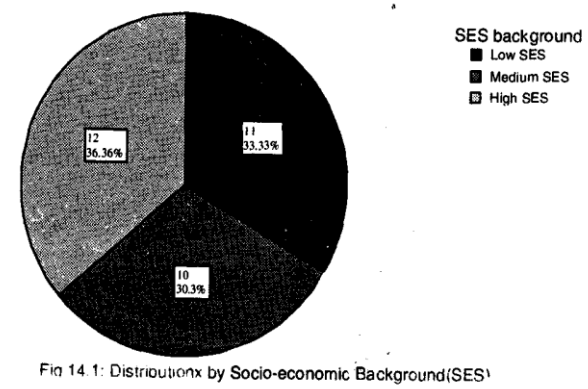


Fig 14.1: Distributionx by Socio-economic Background(SES)

(b) Histograms

Histograms are used to display information on continuous variables that do not have very high range. For example, performance in mathematics varies from 4 to 18 and can bc disphyed using the histogram below.

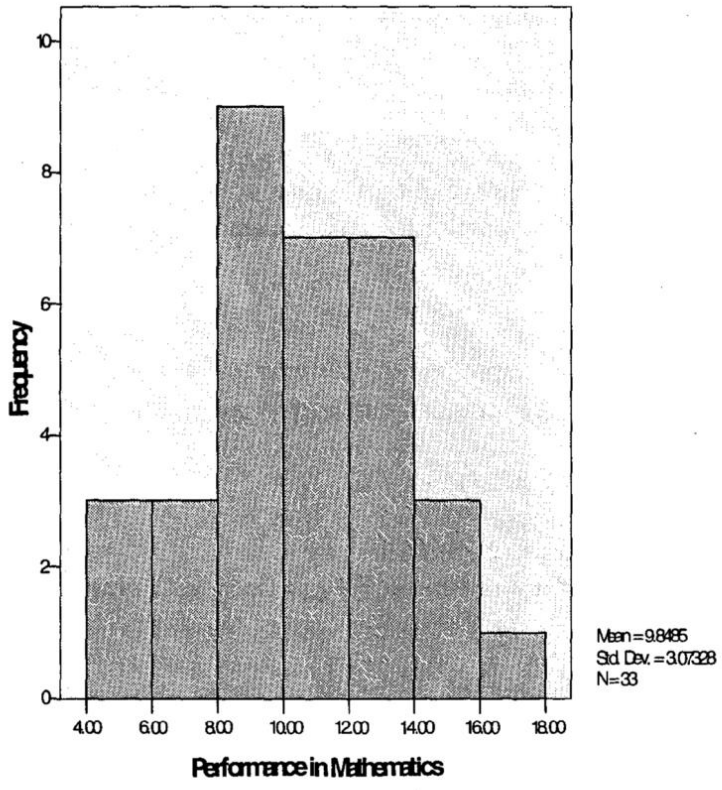


Fig 14.2: Distibution of Performance in Mathematics

Example 14.2

To use the SPSS to obtain the above histogram, the procedure is

- Open file "Practice"
- Click on Graphs > Histogram
- Transfer maths to Variable
- Select Titles and type an appropriate title in footnote
- Click on continue > ok
- Editing and formatting can now be done on the Histogram

(c) Bar Graphs

Example 14.3

(1) Simple Bar Graph

To construct the simple bar graph (displaying only one variable) with the SPSS

- Open file "Practice"
- Click on Graphs > Bar > Simple
- Select Datp in Chart are (e.g. Summaries for group of cases) > Define
- Transfer ses to Category Axis
- Select Titles and type an appropriate Bar Chart title
- Click on Continue >ok
- Editing and formatting can now be done on the Bar Chart.

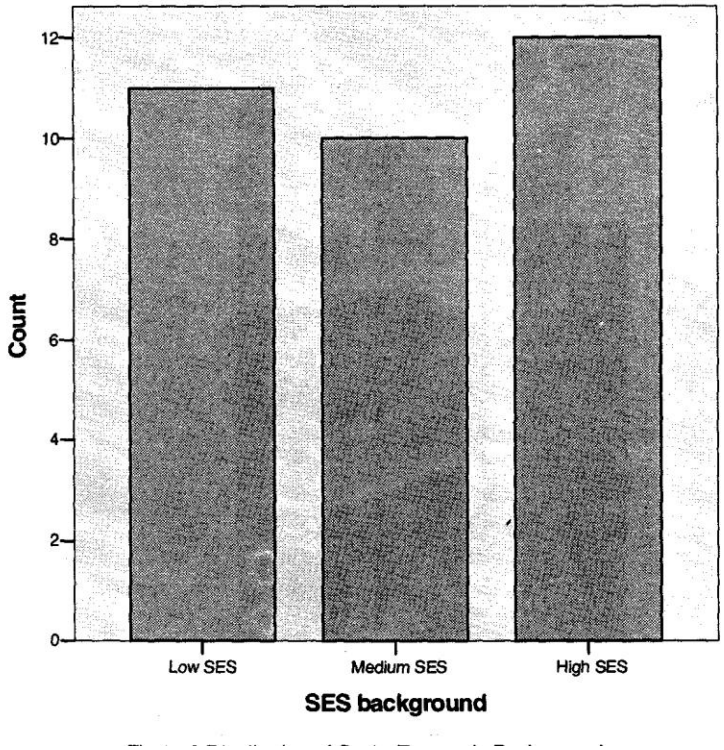


Figure 14.3: Distribution of Socio-Economic Background

(ii) Clustered with two variables

Example 14.4

To construct the clustered bar graph (displaying two variables, one within the other) with the SPSS

- Open file "Practice"
- Click on Graphs > Bar > Clustered
- Select Data in Chart are (e.g. Summaries for group of cases) >Define
  Transfer ses to Category axis
  Transfer sex to Define Clusters by
  Select Titles and type an appropriate Bar Chart title
- Click on Continue > ok
- Editing and formatting can now be done on the Bar Chart.

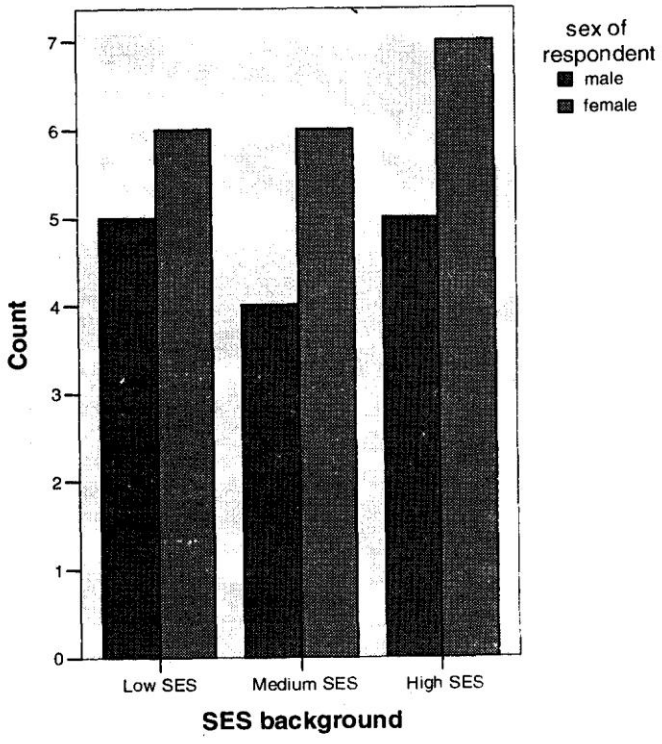


Figure 14.4: Socio-Economic Background clustered by SEX

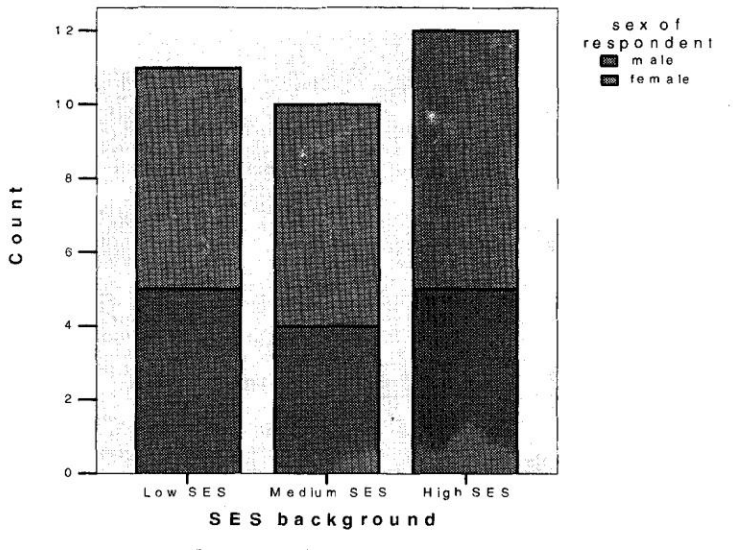


Figure 14.5: SES stacked by sex

Example 14.5

To construct the stacked bar graph (A variable in the category axis has bar segments of the other variable stacked on top of one another) with the SPSS

1. Open file "Practice"
2. Click on Graphs > Bar > Stacked
3. Select Data in Chart are (e.g. Summaries for group of cases) > Define
   Transfer ses to Category axis
   Transfer sex to Define Stacks by
   Select Titles and type an appropriate Bar Chart title
4. Click on continue > ok
5. Editing and formatting can now be done on the Bar Chart.

(c) Line graphs

(i) Simple Line Graph

Example 14.6

A simple line graph is a chart that has a single line connecting one point for each category, case or variable on the category axis.

To construct a simple line graph with the SPSS;

Fig 14.5 SES stacked by Sex

1. Open file "Practice"
2. Click on Graphs>Line>Simple
3. Select Data in Chart are (e.g. Summaries for group of cases) > Define
   Transfer ses to Category axis
   Select Line Represents
   Select Titles and type appropriate Line Chart title 4
4. Click on Continue>ok
5. Editing and formatting can now be done on the Bar Chart

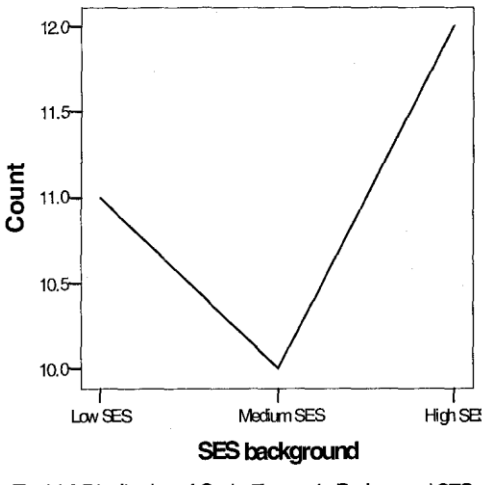


Figure 14.6: Distribution of Socio-Economic Background SES

(ii) Multiple Line Graphs

Example 14.7

In multiple line graphs, the chart has two or more lines. Each line connects one point from each category in the category axis. Lines may represent group of cases, variables or individual cases.

To construct multiple line graph with the SPSS;

1. Open file "Practice"
2. Click on Graphs>-Line>Multiple
3. Select Data in Chart are (e.g. Summaries for group of cases) > Define
   Transfer ses to Category axis
   Transfer sex to Define Lines by
   Select Line Represents

Select Titles and type of an appropriate Line Chart title

4. Click on Continue > ok
5. editing and formatting can now be done on the Bar Chart

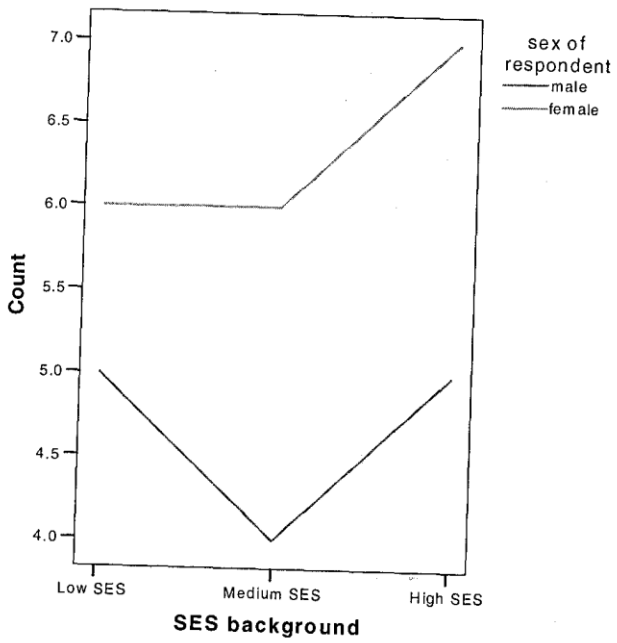


Figure 14.7: Distribution of SES by sex

(c) Scatter Diagrams

A scatter diagram is a plot of two variables on two-scale axis, a vertical and horizontal axis with the ordered pairs as the coordinate. Scatter diagrams are useful in describing the relationship between two variables.

Example 14.8

To construct a scatter diagram with the SPSS

1. Open file "Practice"
2. Click on Graphs > Scatter > Simple > Define
3. Transfer read to X-Axis

   Transfer write to Y-Axis

   Select Titles and type an appropriate Bar Chart title
4. Click on Continue >ok
5. Editing and formatting can now be done on the Scatter Diagram

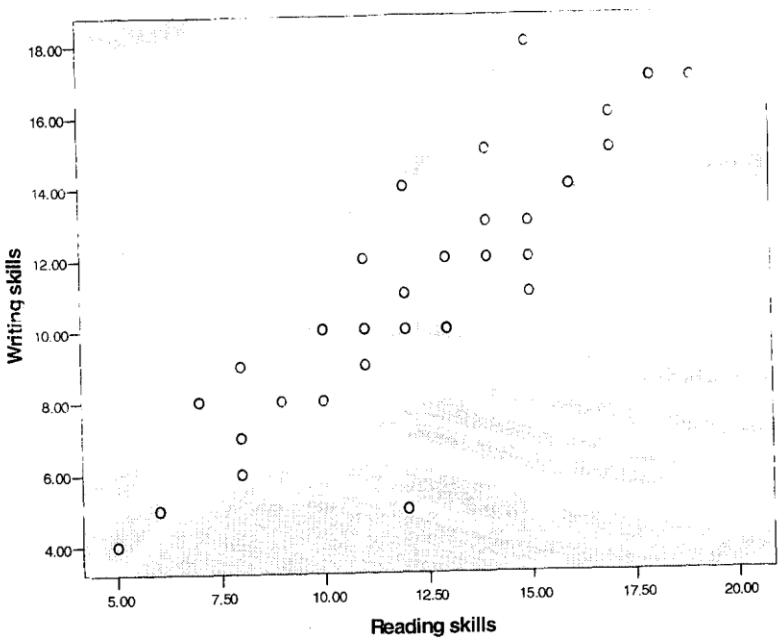


Fig 14.8 Scatter Diagam of Reading and Writing Skills

Tabulation

Summarizing data in tabular form often follows the presentation of data in graph form. Tables may be frequency distributions, or may display measures of central tendency and dispersion such as mean, mode, median, standard deviation and standard error. Constructing tables should be done with care and here are some guidelines:

Principles of tabulation especially of constructing statistical tables may be briefly stated as follows:

1. Every table should have a clear, concise and adequate title so as to make the table intelligible without reference to the text and the title should always be placed just above the body of the table.
2. Every table should be given a distinct number to facilitate easy reference.
3. The column headings (captions) and the row headings (stubs) of the table should be clear and brief.
4. The units of measurement under each heading or sub-heading must always be indicated.

5. Explanatory footnotes. if any, concerning the table should be placed directly beneath the table along with the reference symbols used in the table.
6. Source or sources (if need be) from where the data in the table have been obtained must he indicted just below the table.
7. There should he thick lines to separate the data under one class from the data under another class and the lines separating the subdivisions of the classes should be comparatively thin lines.
8. The columns may he numbered to facilitate reference.
9. Those columns whose data are to he compared should be kept side by side. Similarly, percentages and/or averages must also be kept close to the data.
10. It is generally considered better to approximate figures before tabulation, as the same would reduce unnecessary details in the table itself. And the number of decimal places retained should be uniform.
11. In order to emphasize the relative significance of certain categories, different kinds of types, spacing and indentations may be used
12. Table should be made as logical, clear, accurate and simple as possible. If the data happens to be very large, they should not be crowded in a single table for that would make the table unwieldy and inconvenient.
13. The arrangement of the categories in a table may be chronological, geographical, alphabetical or according to magnitude to facilitate comparison. Above all, the table must suit the needs and requirements or the investigation.
14. Irrelevant material or material that is not used in the text should not appear in the table. For example, although in most frequency tables produced by computer programs, a cumulative frequency column is provided, it may not be needed and should not therefore just be included because it was part of the output.

Tables can be of three major categories

Example 14.9

Univariate tables describe the attributes of one variable and its values are presented in the form of frequencies.

Table 14.1: SES background

Category	Frequency	Percent
Low SES	11	33.3
Medium SES	10	30.3
High SES	12	36.4
Total	33	100.0

To construct a frequency table with the SPSS;

1. Open file "Practice"
2. Click on Analyze >Descriptive Statistics > frequencies
3. Transfer ses to Variable(s) box
   Click on Charts if Charts are needed>Continue
   Click on Statistics (at bottom of window. Only mode should be selected for categorical variables)
4. Click on Continue > ok
5. Editing and formatting can now be done on the Table constructed.

Note that the valid frequency column and the cumulative frequency columns have been suppressed.

Bivariate tables also called contingency tables, describe two variables. These two variables may all be categorical as in Example 14.10

Example 14.10

Table 14.2: SES background by sex of respondent

		Sex of respondents		Total
		Male	Female	
SES background	Low SES	5	6	11
	Medium SES	4	6	10
	High SES	5	7	12
Total		14	19	33

To construct the bivariate table, having two categorical variables, with the SPSS;

1. Open file "Practice"
2. Click on Analyze > Descriptive Statistics > Crosstabs
3. Transfer ses to Row(s)
   Transfer sex to Column(s)
   Click on Cell(s) to select needed cell information
4. Click on Continue > ok
5. Editing and formatting can now be done on the Table constructed.

On the other hand one variable may be categorical and another continuous. Descriptive statistics for the continuous variable are then provided for the different categories of the categorical variable.

Table 14.3 Distribution of Descriptive Statistics of Reading Skills by SES

Level of SES	N	Mean	Std Dev	Std error
Low SES	11	8.81	2.2	.67
Medium SES	10	12.90	2.02	.64
High SES	12	15.08	2.5	.72
Total	33	12.33	3.47	.60

To construct a bivariate table, having one categorical variable and a continuous variable as above, with the SPSS;

1. Open file "Practice"
2. Click on Analyze > Descriptive Statistics > Explore
3. Transfer read to Dependent List

Transfer ses to Factor List

Click on Plots if plots are needed>Continue

Click on Statistics (at bottom of window and select Descriptives)

4. Click on Continue > ok
5. Editing and formatting can now be done on the Table constructed particularly on the descriptive statistics to be retained.

It is also possible to generate tables using the Tables option of SPSS (try this)
Multivariate tables contain many variables and are often difficult to interpret. It is advisable to break multivariate tables into tables with two or at most three variables

9.4 Qualitative data analysis

Inductive data analysis

The qualitative researcher uses complex reasoning that is multifaceted interactive and simultaneous. Although the reasoning is largely inductive, both inductive and deductive processes are at work. The thinking process is also interactive, with a cycling back and forth from data collection and analysis to problem reformulation and back. Adding to this, are the simultaneous activities of collecting, analyzing and writing up results.

Data analysis and interpretation

In general, qualitative analysis is not as abstract as quantitative analysis and is not guided by a large body of formal techniques either. During qualitative data analysis, the investigator searches for patterns of data in form of recurrent behaviours or events, then interprets them moving from description of empirical data to interpretation of meanings. The process of data analysis involves making sense out of text data. It involves moving deeper and deeper into understanding the data, representing the data and making the interpretation of the large amount of data. It takes the following processes:

- It is an ongoing process involving continual reflection about the data, asking analytical questions and writing memos throughout the study

- It involves using open-ended responses, which require asking general questions and developing an analysis from the information supplied by participants.
- The researcher needs to tailor the data analysis beyond the more generic approaches to specific types of qualitative research strategies.

Generic steps in qualitative data analysis and interpretation

- Organize and prepare the data for analysis by transcribing interviews / and group discussions, optically scanning material, typing up field notes or sorting and arranging the data into different themes and by source of information.
- Read through all the data to obtain a general sense of the information and reflect on its overall meaning.
- Begin detailed analysis with a coding process. It is a process of organizing material, taking text data or pictures, segmenting sentences, or images into categories and labelling those categories.
- Use the coding process to generate a description of the setting or people as well as categories of themes for analysis.
- Decide on how the description and themes will be represented in the qualitative narrative.
- Make an interpretation of meaning of the data involving lessons learnt. The lessons could be the researcher's personal interpretation, could be a meaning derived from comparisons of the findings.

The interpretation in qualitative research data can take many forms, be adopted for different types of designs and should be flexible to convey personal, research-based and action meaning.

Strategies to check accuracy of findings in qualitative research

- Triangulate different data sources of information by examining evidence from the sources and using it to build a coherent justification for themes.
- Use member-checking to determine the accuracy of the qualitative findings by taking the final report back to participants and determining whether these participants feel that the records are accurate.
- Use simple descriptors to convey the findings.
- Clarify the bias the researcher may bring to the study as it creates an open and honest narrative that will resonate well with readers.
- Present negative or discrepant information that runs counter to the themes so that discussing contrary information adds to the credibility of an account for a reader.
- Spend prolonged time in the field to develop an in-depth understanding of the phenomenon under study and convey detail about the site and the people that brings about credibility to the narrative account.
- Use peer debriefing to enhance the accuracy of the account by locating a person to do the reviewing and asking questions about the qualitative study so that the account will resonate with people other than the researcher.
- Use external auditors to review the entire project.

Review Questions

1. 1. You have administered 500 Questionnaires on a research project. Discuss the steps you would take in preparing the data for analysis.
2. The following data has been collected for 50 students on performance in mathematics.

Mathemat13ics scores for 50 students

12	17	16	19	10
10	11	17	10	16
17	16	11	15	13
5	8	15	11	14
11	7	17	13	10
6	3	11	14	8

9	4	5	11	7
12	8	9	15	4
10	11	14	8	18
2	5	3	2	11

(a) Determine the number of intervals using a suitable formula

(b) Construct a suitable frequency distribution

3. Enter the data as an SPSS file
4. Use the file in no 3 and recode the data into 4 categories
   0-5, 6-10, 11-15 and 16-20
5. Use the categories in no 4 and the SPSS program to produce
   (a) Pie Chart (b) Bar Graph (c) Line Graph
6. Use the data in no 3 to produce the descriptive statistics of performance in mathematics

Unit 10
Academic Writing
10.1 Introduction

1. Writing for academia is much different from writing for pleasure. Academic writing involves a formal tone that many students have never experienced. It requires planning and organizational skills that many students aren't familiar with. Yet teachers often expect students to come to class understanding how to write in a professional manner.

So what exactly is academic writing and how can a student improve his or her academic writing skills? Thais, Chris & Terry, (2006) define academic writing as any writing that fulfills a purpose of Education in a collage or university. For most teachers the term implies students writing in response to an academic assignment or for publication, read and conference attended by other academics. This paper gives a guide to students on writing academic documents such as course works, research proposals and reports with particular reference to the American Psychological Association Publication manual of 2001. Specifically the paper focuses on titles in a document; lengths (i.e. document length, title length, and paragraph lengths); proper use of numbers; spacing; margins; abbreviations; how to avoid gender bias; proper use of tables and charts; capital letters and footnotes; quotation/citation of sources as a means of avoiding plagiarism; list of references and appendices, following APA Fifth Edition (APA, 2001) Principles. The Paper ends with the development of writing skills.

2 Headings or titles

A good document should be in a logical order starting with a main heading or title (e.g. significance of International Trade). Most heading are designed to entice further reading. Headings in Documents should enable your Reader to decide whether or not to continue reading that section. Use effective headings make it easy for your Reader to understand your Document. Note that the Main Title should have an own page, called the Title Page, showing the Title, Author, Description of document and Date in that order. For a sample see the very Title Page of this Paper. After the Main Title, then we have sections, sub-sections, paragraphs and so on. The sections and subsections should have identification headings or titles,

because as Creswell (1994) puts it "readers need 'road signs' to guide them from one major idea to the next" (p.198). However, these headings should have no redundancies.

The first chapter or section in a document should be an introduction, because "readers ... need to see the overall organisation of ideas through introductory paragraphs and to be told, in summary, the most salient points they should remember" (Creswell, 1994: 198). All headings or titles of equal importance should be in the same font (i.e. at same level): Thus this applies to all chapter headings / titles (at one level); same to all sections (at another level); then all subsections (at yet another level); and so on.

3 Lengths

A good document should have appropriate length. For instance a research proposal should be about 15 pages of size A4 for Bachelors and Masters and 25 pages of size A4 for PhD (Tiberondwa, 2003: 2). Similarly course works may be given lengths say five pages, which have to be respected. The title of a given document should be of a suitable length. For example a research proposal title for a bachelor's proposal in KIU should not exceed 19 words. Regarding paragraphs, one-sentence paragraphs are discouraged, while very lengthy paragraphs of say whole page should equally be avoided

4 Numbers: Their proper use

In proper academic writing, numbers should not be written anyhow. For example numbers less than 10 should be written in words and 10 and above may be put in numerical figures: However, numerical figures (whether 10 and above or not) should not start sentences. For example while the sentence; "The number who attended class yesterday was 18" is OK, the equivalent sentence; "18 attended class yesterday" is not! Page numbers should appear in Arabic numbering in the right hand corner (top or bottom) of each page. However pages before Chap. One (say in a dissertation), are numbered in small Roman numbers (Maicibi, 2004: 60; Tiberondwa, 2003: 3). Tables should be numbered say as Table 1, Table 2, ……, or

Table 2.3 (for the third table in Chap. Two), and so on. Figures should be similarly numbered (American Psychological Association, APA, 2001:155).

5 Spacing

Double spacing is expected throughout a word processed academic document to allow for (e.g. supervisors') comments; typists and typesetters can also easily read all marks (APA, 2001: xxiii; Maicibi, 2004: 60).

6 Margins

The margins at the top, bottom, left and right sides of every page should be uniform. One inch margins are recommended but the left hand margin can be wider (say one and half inches) to allow for binding or punching (Tiberondwa, 2003: 3).

7 Abbreviations

As much as possible, abbreviations should be avoided. But where they are absolutely necessary, or indispensable full words must be written out completely on first appearance and followed by the abbreviations in parentheses or brackets, say in this Paper, Kampala International University (KIU): Then the abbreviation, KIU, can be used henceforth. But some abbreviations (e.g. PhD, MA, WFP, IMF, UNESCO, UK, US, etc.) are accepted as words without prior explanation, because they appear like full words in dictionaries or other respectable sources (Maicibi, 2004). Latin abbreviations (i.e., e.g., etc., etc.) can only be used in parenthetical or bracket material; else their English equivalents are used. For example while the sentence: "In Uganda there are many higher institutions of learning i.e. universities and polytechnics e.g. KIU, Makerere, IUIU etc" is not OK, the equivalent sentence: "In Uganda there are many higher institutions of learning, that is, universities and polytechnics (e.g. KIU, Makerere, IUIU etc.)" is OK.

8 Bias: How to avoid it

Good academic writing should ensure fair treatment of individuals and groups and requires publications to avoid perpetuating demeaning attitudes and biased assumptions about people. Constructions that imply bias against persons on the

basis of gender, disability, age, and so on, should be avoided. Just as one checks for spelling, grammar and wordiness and meaning, one should practice reading over one's work for bias (APA, 2001: 6 1-62). The most common of all is "gender bias", which can occur when pronouns are used carelessly, as when the masculine pronoun "he" is used to refer to all genders. The use of a word such as "master" and "man" as a generic noun or as an ending for an occupation title (e.g. headmaster, policeman) can be ambiguous and may imply incorrectly that all persons in the group are male!

How then do we avoid such gender bias? There are many alternatives to the generic "he" including rephrasing from the gender to the specific noun (e.g. from "When a researcher chooses the quantitative research approach, **he** finishes quickly" to "When a researcher chooses the quantitative research approach, **that researcher** finishes quickly"); using plural nouns or pronouns (e.g. from "A student who attends regularly, is sure of **his** good grades" to **"Students** who attend regularly, are sure of **their** good grades"). Replacing the pronoun with an article (e.g. "A good presenter must proofread his paper before presenting it" to "A good presenter must proofread **the** paper before presenting it"); and dropping the pronoun (e.g. from "A bachelor's student in KIU must perfect his APA Writing" to "A bachelors student in KIU must perfect APA Writing"). Replacing "he" with "he or she" or "she or he". However, this should be done sparingly because the repetitions can become tiresome. (APA, 2001).

9 Tables

Tables are efficient, enabling a writer to present a large amount of data in a small amount of space. Tables are an orderly display of rows and columns, which aids comparisons. For several reasons, you should be selective in choosing how many tables to include in any document. First, a reader may have difficulty sorting through a large number of tables and may lose track of your message. Second, a disproportionately large number of tables compared with a small amount of text can cause problems with the layout of typeset pages: Text that is broken up with tables will be harder to follow. Third, tables are complicated to typeset and are

therefore more expensive to publish than text. For these reasons, reserve tables for crucial data that are directly related to the content of your document and for simplifying text that would otherwise be dense with numbers (APA, 2001).

An informative table supplements - instead of duplicates - the text. In the text, tell the reader what to look for (in a given table). Discuss only the table's highlights: If you discuss every item of the table in the text, the table is irrelevant (APA, 2001). Each table should have an identification number such as Table 1 or Table 4.2 (to avoid referring to "the table above" or "the table below"), and a brief but clear and explanatory title (APA, 2001).

10 Graphics or charts or figures

Any illustration than a table is a graphic. Thus a graphic may be a chart, graph, photo, drawing, or other depiction. Consider carefully whether to use a graphic. While tables provide exact information, graphics require the reader to estimate values. On the other hand, graphics convey at a quick glance an overall pattern of results. In deciding whether to use a graphic ask yourself such questions as; what idea do I need to convey? Is the graphic really necessary? If it duplicates text, it is not necessary. What type of graphic (e.g. line graph, bar graph, circular graph, drawing, map, photo, etc.) is most suited for my purpose? (APA, 2001: 176). The standards for good graphics are simplicity, clarity and continuity.

A good graphic augments rather than duplicates text; conveys only essential facts; omits visually distracting detail; is easy to read, is consistent with and is prepared in the same style as similar graphics in the same document; is carefully planned and prepared (APA, 2001: 177). As to when to use a particular graphic in data summary, we should consider advantages of that particular graph; for example; (a) A line or x-y or Cartesian graph is useful when studying or describing the relationship between two numerical variables (e.g. quantity supplied and the price of a given commodity); (b) A bar graph is for comparing the values of a numerical variable (e.g. number of employees) for different entities• (e.g. companies); (c) A

circular or pie graph is for comparing the sizes of the components (e.g. genders) of a numerical variable (e.g. number of students in a school) (APA, 2001: 177-186).

11 Capitalization

In Academic Writing, the term to "capitalize" means to use a capital or upper case letter for the first letter of a word. We are not supposed to capitalize anyhow! Capitalize names of individuals (e.g. Nakibinge), institutions (e.g. Kampala International University: note that the words "International" and "University" are also capitalized, because they are part of the surname; otherwise if not part of any surname, the terms "international" and "university" are not capitalized). Common nouns (e.g. international, university, district, etc.) are not capitalized unless they are starting a new sentence. You may also capitalize the keywords in a heading or subheading, which is often called "typing in upper case and lower case letters" (APA, 2001: 289): For example the Heading of Section 14 of this Paper could appear as; **"List of References".**

12 Footnotes

Footnotes supplement or amplify substantive information in text; they should not include complicated or irrelevant information. Because they are distracting to readers, footnotes should be included only if they strengthen the discussion.

13 Plagiarism: How to avoid it

Academicians do not claim words and ideas of others as their own: They give credit where credit is due (Amin, 2005: 37; APA, 200I). The question is: Why cite or quote sources? Bakkabulindi (2004: 334) observes that apart from helping us to avoid plagiarism which is even chargeable in court, citing or quoting authors, plays several roles, including the following; first, it gives authenticity to your document, that is confirms that what you are saying has the support of (many) others. Second, citing or quoting authors is one way of giving disclaimers: Should the facts in the citation be wrong assuming you are not misquoting, blame shifts from you to the source. Third, citing or quoting authors guides readers to your sources in case they want more facts there from.

Fourth, citing or quoting authors helps readers assess reliability of cited sources: We have at one time or another heard of "reliable" sources and sources that are less so! Fifth, citing or quoting authors helps readers who may want to verify whether you did not misquote! Another question now could be: How then do we cite or quote sources? Bakkabulindi (2004: 335) suggests that you; (i) Cite or quote a particular source at the "appropriate spot" in your document: Simply putting a "List of References" or in that case to be more correct, a "Bibliography", only at the end of the document is not enough for the reader to know what came from where!; (ii) In the body of the document, only give the author's surname, year of publication and page(s) where necessary: The author's initials and title of the document, which is usually long, and the publisher go to the List of References;

(iii) You may quote directly that is word-to-word. Should you choose to do this, incorporate short quotations (of less than 40 words) in the text, enclosed in double quotation marks (Maicibi, 2004: 6 1-62; Tiberondwa, 2003: 4). For a long quotation (of 40 words or more), left-indent the quotation without quotation marks: This is called a "block citation or quotation" (APA, 2001). Direct quotations must be accurate, following the wording, spelling and punctuation of the original source, even if the source is incorrect! If there is any incorrect spelling, punctuation or grammar, follow it with the abbreviation "sic" in brackets, that is [sic] (APA, 2001: 118). Note that "sic" is the short form of "sicut", a Latin word which means "as given or done or said".

(iv) Use three spaced ellipsis points (...) within a sentence to indicate that you have omitted materials from the original source, and four points (....) to indicate any omissions between two sentences (APA, 2001: 119). "Use brackets **[ ]**, not parentheses ( ) to enclose material (e.g. additions or explanations) inserted in a [direct] quotation by somebody else to the original source" (APA, 2001: 120): For example, in this very sentence, the word [direct] was added by the author of the Paper. If you want to emphasize a word(s) in a direct quotation, underscore the word(s), and immediately after the underscored word(s), insert within brackets the

words "underscore added", that is [underscore added] (APA, 2001: 120). However, there are minor changes one can make to a direct quotation without explanation: For example the first letter of the first word in the quotation may be changed to an upper case or lower case letter, depending on its position in a sentence. Punctuation marks at the end of a sentence may be changed (e.g. from "full stop" to "comma" and vice versa) to fit the syntax. Single quotation marks may be changed to double quotation marks (APA, 2001: 119).

Otherwise we usually cite or quote indirectly, that is we use other people's ideas but not necessarily their words. But all the same, sources should be cited as APA stresses when its publication manual says that "whether paraphrasing or quoting an author directly, you must credit the source" (APA, 2001: 120). As to the style of citing or quoting, APA (2001: 118, 121) and Bakkabulindi (2004: 337) stress that the writer should not bore the reader with only one style of citation because there are several styles: For example suppose we want to cite or quote p. 56 of Maicibi (2004), we may do this by for example; (i) **Putting the whole source at the beginning of the citation**: In which case we can say something like: "Maicibi (2004: 56) observes that when lecturers with different backgrounds guide a student, the student could get confused"; we could alternatively use something like; "According to Maicibi (2004: 56) when lecturers with different backgrounds guide a student, the student could get confused".

We could altogether have used another style, namely; **(ii)Putting one part of the source at the beginning and another part of the source at the end of the citation:** In which case we could say something like: "Maicibi (2004) observes that lecturers with different backgrounds guide a student, the student could get confused (p. 56)"; other wise, we could alternatively resort to; **(iii) Putting the whole source in the middle of** a sentence: In which case we could say such things as: "when lecturers with different backgrounds guide a student, the student could get confused (Maicibi, 2004: 1) particularly where there are no general guidelines". Yet another style is; **(iv) Putting the whole source at the end of**

citation: For example, we could use something like: "when lecturers with different backgrounds guide a student, the student could get confused (Maicibi, 2004: 56)".

10.2 List of references

All the cited references are put at the end of the document say a proposal or research report, immediately after the last chapter or section but before appendices as a "List of References", which list helps interested readers to identify and retrieve the sources. This List differs from a "Bibliography" in that the former gives only those references cited in the text. The first thing to see in every source in this List is the (first) author's surname: Then all the sources are arranged in alphabetical order of these (first) surnames (Maicibi, 2004). Each particular source or work in the reference list will take a form pertinent to its nature. For example, is it a text book? Chapter in edited book? Dissertation or thesis? Journal paper? Conference or workshop or seminar paper? Newspaper article? Website? Name it? Students are likely to cite sources falling in these and other forms; hence the following examples

Books, single author

Format	Author's Surname, Initials. (Date of publication). Title (Edition, if not the first). Place of publication: publisher
Example	Amin, M. E. (2005). *Social Science Research: Conceptions, Methodology & Analysis*. Kampala: Makerere University Printery.

Books, multiple authors

Format	1st Author's Surname, Initials, 2nd Author's Surname, Initials, 3rd Author's Surname, Initials, 4th uthor's Surname, Initials, 5th Author's Surname, Initials, & 6th Author's Surname, Initials. (Date of publication). Title (Edition, if not the first). Place of publication: Publisher.

	More than 6 authors: As above, but after the sixth author's name and initial use "et al." to indicate the remaining authors.
Example	Kiweewa, E.N, Kibuuka M. T, Gulebyo, M.S, Nakate S. Kule J.W. *Post Graduate* *Experience in KIU*. Kampala: M.K Publishers
In the text	***2 – 6 authors*** Name all the authors in the first citation. Beginning with the second reference, name only the first author, then add "et al." ***More than 6 authors:*** Use the first authors name, then et al. citations including the first e.g. Steward et al (2003)

Books, corporate author

Where there is no named individual as author, this is often because there has been shared or corporate responsibility for the production of the material. In this case, the corporate name becomes the author. Corporate authors include government bodies, companies, professional bodies, societies, international organisations.

Format:	Name of the corporate author. (Date). Title (Edition, if not the first). Place of publication: Publisher. Use the word "Author" for the publisher, if author and publisher are identical.
Example	Institute of Chartered Accountants in England & Wales. (2004). *Sustainability:* The role of accountants. London: Author
In the text	(Institute of Chartered Accountants in England & Wales, 2004)

Books, no author

Some works such as dictionaries and reference books have no author

Format	Title (Edition, if not the first). (Date). Place of publication: Publisher.
Example:	Merriam-Webster's collegiate dictionary (15th ed.). (2003). Springfield, MA: Merriam-Webster.
In the text:	(Merriam-Webster's Collegiate Dictionary, 2003)

Books, edited

Apply the above rules for single author, 2-6 authors, and more than 6 authors, to editors

Format:	1st Editor's Surname, initials, & 2nd Editor's Surname, initials. (Eds.). (Year of publication). Title (Edition if not the first). Place of publication: Publisher.
Examples:	Mendenhall, M., Oddou, G., & Stahl, G. (Eds.). (2007). Readings and cases in international human resource management (4th ed.). London: Routledge. Lee, M. (Ed.). (2008). Government public relations: A reader. Boca Raton, FL: CRC Press.

Books, chapter from edited

Format:	Contributing author's surname, initials. (Date of publication). Title of chapter. In Initials Surname of editor(s) (Ed.) or (Eds.), Title of book (Page numbers). Place of publication: Publisher.
Examples:	Bantz, C. R. (1995). Social dimensions of software development. In J.A. Anderson (Ed.), Annual review of software management and development (pp. 502-510). Newbury Park, CA: Sage.

Books, electronic

Format:	Author's Surname, Initials. (Date of publication). Title. (Edition, if not the first). Place of publication: Publisher. Retrieved day month, year, from website URL
Examples:	Saunders, M., Lewis, P., & Thornhill, A. (2007). Research methods for business students (4th ed.).arlow: Pearson. Retrieved 28 October, 2008, from http://www.myilibrary.com?id=177101

Journal articles, printed

The rules on how to cite multiple authors, shown on page 5 under referencing style for books, also apply for journal articles and other forms of publication.

Format:	Author's Surname, initials. (Year of journal). Full title of article. Full Title of Journal, Volume Number Issue Number*), page numbers of article. * The issue number is not necessary if the journal pages are numbered continuously throughout the year, only if each issue begins with page 1.
Examples:	Trappey, C. (1996). A meta-analysis of consumer choice and subliminal advertising. Psychology and Marketing, 13, 517-530. Stiles, P., & Taylor, B. (1993). Benchmarking corporate governance: An update. Long Range Planning, 26(6), 138-139.

Journal articles, electronic

Journals articles are available through subscription databases, such as Business Source Premier, Emerald and Science Direct, but some are freely available on Internet websites.

Format:	***Database:*** Author's Surname, initials. (Year of journal issue in which article appeared). Full title of article. Full Title of Journal, Volume Number (Issue Number*), page numbers of article. Retrieved day month, year, from ... database. ***Website:*** Author's Surname, initials. (Year of journal issue in which article appeared). Full title of article. Full Title of Journal, Volume Number (Issue Number*), page numbers of article. Retrieved day month, year, from website URL * The issue number is not necessary if the journal pages are numbered continuously throughout the year, only if each issue begins with page 1.
Examples:	**Examples:** ***Database:*** Bryd-Bredbenner, C., Wong, A., & Cottee, P. (2000). Consumer understanding of US and EU nutrition labels. British Food Journal, 103, 615-629. Retrieved 22 October, 2008, from Emerald database. ***Website:*** De Blasio, G. G. (2008). Understanding McDonald's among the "World's Most Ethical Companies". Electronic Journal of Business Ethics and Organization Studies, 13(1), 5-12, Retrieved 28 October, 2008, from http://ejbo.jyu.fi/pdf/ejbo_vol13_no1_pages_5- 12 pdf

Newspaper articles, printed

Format:	Author's Surname, initials. (Year, month day). Full title of article. Title of Newspaper, page numbers of article. ***If no author:*** Full title of article. (Year, month day). Title of Newspaper, page numbers of article.
Examples:	Bowers, S. (2009, April 15). Lehman administrators' task will dwarf Enron, creditors told. Guardian, p. 39. Picking up the bills. (2005, June 4). Independent, pp.28-29.

Newspaper articles, electronic

Newspaper articles are available from the database Lexis Nexis, or from newspapers' own websites

Format:	***Database:*** Author's Surname, initials. (Year, month day). Full title of article. Title of Newspaper, page numbers of article. Retrieved day month, year, from ... database. ***If no author:*** Full title of article. (Year, month day). Title of Newspaper, page numbers of article. Retrieved day month, year, from... database. ***Website:*** Author's Surname, initials. (Year, month day). Full title of article. Title of Newspaper. Retrieved day month, year, from website URL ***If no author:*** Full title of article. (Year, month day). Title of Newspaper. Retrieved day month, year, from website URL
Examples:	Bowers, S. (2008, November 15). Lehman administrators' task will dwarf Enron, creditors told. Guardian, p. 39. Retrieved 18 November, 2008, from

	Lexis Nexis database. Emmett, S. (2008, May 9). Buy-to-let: Professional investors cash in on the credit crunch. The Times Retrieved 27 October, 2008, from http://www.timesonline.co.uk

Conference papers and proceedings

- Capitalize the name of the conference or symposium.
- Treat regularly published proceeding as journals

Format:	Author's Surname, Initials. (Year of publication). Title of conference paper. In Initials. Surname of editor of proceedings (Ed.), Title of conference proceedings (page numbers of contribution). Place of publication: Publisher. **Regularly published:** Author, Initials. (Date of publication). Title of conference paper. Title of Proceedings, volume number, page numbers.
Examples:	Proctor, P. (1998). The tutorial: Combining asynchronous and synchronous learning. In S. Banks (Ed.), Networked Lifelong Learning: Proceedings of the 1998 International Conference (pp.3.1 - 3.7). Sheffield: University of Sheffield.

Dissertations and theses

Format:	Author's Surname, Initials. (Year). Full Title. Unpublished doctoral dissertation, awarding institution. Author's Surname, Initials. (Year). Full Title. Unpublished master's

	thesis, awarding institution.
Examples:	Bakkabulindi, F. E. K. (2007). Social Correlates for Innovation Adoption in Education Organisations: The Case of Makerere University. Unpublished doctoral thesis, Makerere University Kampala Kiweewa Emmanuel (2006). Determinants of Poverty in Uganda: The Case of Kabonera Sub County Masaka District. Unpublished Masters dissertation, Kampala International University

Web pages and websites

- Direct readers as closely as possible to the information being cited – wherever possible, reference specific documents rather than home or menu pages.
- As a minimum, a reference to an Internet source should provide a document title or description, a date (either date of publication or date of retrieval), and a web address. Wherever possible identify the authors of the document as well.
- If the author of the document cannot be identified, begin the reference with the title of the document.
- If there isn't a date available for the document, you can use (n.d.) for no date.
- When an Internet document is more than one Web page, provide a URL that links to the home page or entry page for the document.

Format:	***Web page with author:*** Author's Surname, initials. (Date). Title of page or internet document. Retrieved day month, year, from web address ***If no author:*** Full title of page. (Date). Retrieved day month, year, from web address
Examples:	Tesco (2008). Corporate social responsibility review 2008. Retrieved November 3, 2008, from http://www.tescoreports.com/

	crreview08/index.html Acas (2008). Employee appraisal. Retrieved July 14, 2008, from http://www.acas.org.uk/CHttpHandler.ashx?id=254&p=0

Referencing two or more sources by the same author

- Using the author's name for all entries, list the entries by year (earliest first).
- When an author appears both as a sole author and, in another citation, as the first author of several, list the sole author entries first.
- Use the format below when the author(s) and the date of publication are exactly the same for more than one source. List the titles alphabetically and add a,b,c,d, etc to the publication date.

Format:	***First source, e.g. a book:*** Author's Surname, Initials. (Date of publication + a). Title (Edition, if not the first). Place of publication: Publisher. ***Second source, e.g. a journal:*** Author's Surname, initials. (Year of journal + b). Full title of article. Full Title of Journal, Volume Number (Issue Number), page numbers of article. ***Third source:*** Author's Surname, Initials. (Date of publication + c). [etc]
Examples:	Brown, S. (1993a). Postmodern marketing? European Journal of Marketing, 27(4), 19-34. Brown, S. (1993b). Postmodern marketing: Principles, practice and panaceas. Irish Marketing Review, 6, 91-99.
In the text	(Brown, 1993a) (Brown, 1993b)

Secondary referencing

- Give the secondary source in the reference list. In the text, name the primary work, and give
  a citation for the secondary source.
- For example, if Smith and Walker's work is cited in Evans, and you have not read Smith and
  Walker's original work –

Reference List	Evans, W.A. (1994). Approaches to intelligent information retrieval. Information Processing and Management, 7, 147-168.
In the text:	Smith and Walker's study (as cited in Evans, 1994)

17. Good Study Habits and Revision techniques

One of the factors besides other that limits good performance among students is poor study habits of study that they employ. Below are some guideline for good and effective learning and revision

For any lecture you attend, be very alert and take note of the key points that your lecturer emphasize. After the lecture spare some time to recognise the lecture notes in your own way so that it is best understood by you. This habit helps you to be self independent and grooms you to study without having to rely on your lecturer or tutor for guidance.

It is important to have a study time table which you must follow strictly and all courses (papers) should be give equal attention during the week

It is also important to choose the best environment for study where there is maximum calm and peace. A noisy environment distracts ones attention in the course of reading. For this reason the best place for serious reading is the library. However every one also has his or her the best study time, try to establish your best study time and utilise it to the maximum

At a particular time on a given day your time table requires you to read say macroeconomics than the next thing is to choose topic from macroeconomics (e.g. National Income), once you have done this, the next thing is to peruse through the topic chosen noting mentally the main headings, sub headings then important points.

Then begin a systematic and concentrated reading of each sub-heading step by step until the whole chapter is completed. After having done so attempt to answer questions at the end of that chapter (or where these questions are not available attempt examination paper questions relating to the topic you have read). You should then go over your essay and compare the points noted in the chapter so that you can discover the points you have missed out.

Some students prefer to read in groups. In this case, all members of the group should read the same topic as illustrated above and at the end of the reading, one member of the group presents the main points of the topic while his/her colleagues listen and compare with the main points required for the question. Their role will be to note the wrong facts of main points missed out. The significance of answering questions or summarizing the main points at the end of the reading session is to impress further on the brain the ideas or facts read about so that they are retained in the brain longer.

At the end of the reading session and attempting questions or summarising the main points, the brain would have been very exhausted hence, it is a important that you retire and have a peaceful rest so that the material you have read is not disturbed by tasking the brain with another mental activity. The rationale here is that as human beings we tend to remember what we have done last, hence you must be careful after such a tasking exercise of revising.

As examinations draws near, the student should not overstrain himself/herself by revising for long hours. The cumulative effect of long sleepless nights spent trying to cover uncovered ground may only read to material breakdown. Hence students

are advised to make just "finishing touches" by noting only the key points, diagrams sketches and the like of topic they feel are likely to appear in the exam. This is applicable to students who do not wait for the examination timetable to begin reading.

18 Conclusion

This Paper has given a few hints on the style of writing (supposed to be) used when writing academic documents such as course works, research proposals, reports, journal papers and others. Having given a brief historical background to the APA Guidelines, the Paper dealt with headings or titles; lengths (i.e. document length, title length, and paragraph length); proper use of numbers, spacing, margins, and abbreviations; how to avoid (gender) bias; proper use of tables and charts, capital letters and footnotes; quotation or citation of sources to avoid plagiarism; list of references; use of appendices and ended with development of writing skills. Rules are many and cannot be grasped at once. Thus, constantly refer to this Paper as you write your coursework papers and the many academic writing projects yet to come.

READING MATERIALS

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